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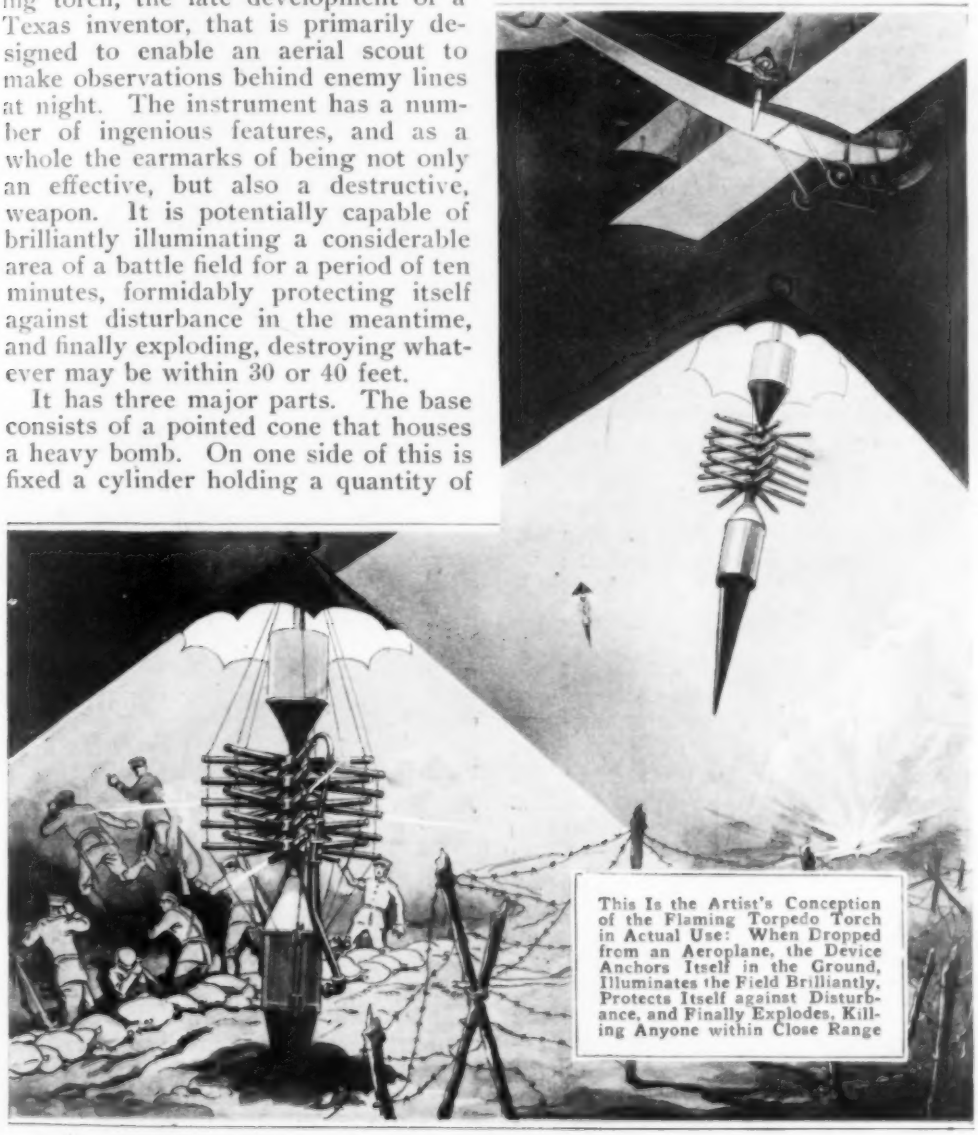
Vol. 26 AUGUST, 1916 No. 2

Aerial Torpedo Torch Lights Battle Field

PROMINENT military officers have expressed their approval of a flaring torch, the late development of a Texas inventor, that is primarily designed to enable an aerial scout to make observations behind enemy lines at night. The instrument has a number of ingenious features, and as a whole the earmarks of being not only an effective, but also a destructive, weapon. It is potentially capable of brilliantly illuminating a considerable area of a battle field for a period of ten minutes, formidably protecting itself against disturbance in the meantime, and finally exploding, destroying whatever may be within 30 or 40 feet.

It has three major parts. The base consists of a pointed cone that houses a heavy bomb. On one side of this is fixed a cylinder holding a quantity of powder for priming purposes. At the middle, radiating in all directions a



This Is the Artist's Conception of the Flaming Torpedo Torch in Actual Use: When Dropped from an Aeroplane, the Device Anchors Itself in the Ground, Illuminates the Field Brilliantly, Protects Itself against Disturbance, and Finally Explodes, Killing Anyone within Close Range

couple of feet from the bottom, are 35 rifle barrels arranged in tiers of seven. Surmounting these is a tank containing

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This Photograph of a Model of the Flaming Torpedo Torch Gives One a Fairly Clear Idea of Its Size and the Plan of Construction

a special powder that gives off an intense light when ignited. Capping the top is a parachute-shaped reflector that serves the double function of properly distributing the light rays and in a degree breaking the fall of the torch, which is supposed to be dropped from an aeroplane.

In its present form the apparatus weighs 38 lb., and it is estimated that three or four like it could be conveniently carried by a military biplane. As needed, they would be released by the observer so as to strike desired points within the enemy's lines. The device is balanced so that it falls point down, and from an average height will penetrate the ground for a distance of about a foot, thus firmly anchoring itself. The resulting impact discharges a percussion cap that ignites the cylinder of priming powder. This touches off the illuminating substance and ignites a series of time fuses connecting each of the rifles. While the torch flares brightly, throwing its light in all directions across a field, the rifles discharge one after the other, making any attempt to overturn it exceedingly hazardous. At the same time that the light extinguishes itself a fuse leading to the bomb in the base is lighted. The explosion of the latter demolishes the torch and does damage to anything near it.

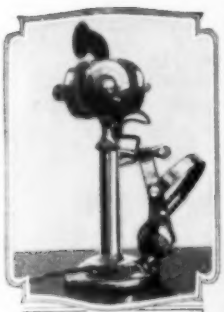
Certain officers of the expeditionary force now in Mexico are said to have examined the apparatus and reported favorably regarding it. The inventor has declined an offer of a foreign power to purchase the instrument, including the secret of the illuminating powder it uses, hoping to be able to interest the Washington government in it as equipment for our aerial forces.

FAST ROLLER SKATER BEATS MOTORCYCLIST IN RACE

A novel speed contest was held recently when a roller skater and a man riding a motorcycle raced 16 times around the big roll-

Start of a Race between a Roller Skater and a Motorcyclist in Which the Former Finished Three Feet Ahead of His Opponent

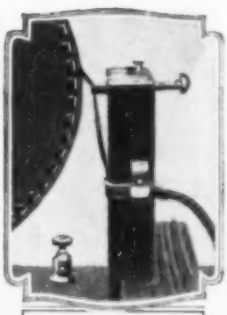
er-skating rink at Peoria, Ill. The skater completed the race in 3 min. $\frac{2}{5}$ sec., lowering his former record by 19 sec. and finishing less than three feet ahead of his opponent. The fact that the rink has no banks at the turns made it necessary for the motorcyclist to shut off his engine at each of the four corners, a handicap that allowed the man on skates to finish in the lead.



For Telephonic Purposes Triple Transmitters are Employed

Youthful Inventor Operating His Wireless-Telephone Fog-Signal Device

Working Radius of Instrument is Controlled by Gauge at Left



Plugs on the Rotary Contact Breaker Form the "Dashes" in the Signal Calls

WIRELESS FOG SIGNAL AND TELEPHONE FOR MARINE USE

By ALBERT MARPLE

WHAT apparently is a practicable wireless fog signal for use on ocean liners has been developed at Los Angeles by a 22-year-old youth. It is claimed that if ships and dangerous rocks were universally equipped with these signals many marine disasters that now occur through collisions could be avoided.

The device has two distinct parts: a wireless telephone or wave producer, and a rotary contact breaker. Its operation, like its construction, is simple. From a storage battery, which furnishes the electrical energy, the current passes through the rotary contact breaker, propelled by a small electric motor, to the wireless telephone. After leaving the wave producer it is led through a cable to an aerial. By using the rotary contact breaker instead of telephone transmitters, the device sends out electrical waves which may be regulated from a low buzzing sound to a high-pitched whistle. These are caught by a receiver, equipped with a gaseous amplifier, on an approaching boat the moment that vessel enters the radius of the sending apparatus. When these combined sending and receiving instruments are installed on two boats, the officers of each are immediately warned of the other's presence when the vessels come within a certain range of each other. A simple adjustment of an indicator hand sets the radius of the waves at 100 yd., a mile, or even farther. After two boats have come within range of each other's instruments and draw nearer, the signal sent from each apparatus gradually registers louder and louder in the receiver of the opposing device. In case of a vessel becoming enveloped in a dense fog or overtaken by a heavy storm, the commanding officer or his assistant takes his place upon the bridge in front of the fog signal, adjusts the headgear receiver, and starts the motor which propels the rotary contact breaker. So long as no buzzing or whistling sound is detected in the receivers, he knows that there is no danger of colliding with another ship similarly equipped. But should the buzzing tone be heard, he would be informed of possible danger.

It is also possible to use the device as a sea telephone, so that the moment the officer on the bridge catches the warning signal he may, by throwing a small lever, convert his instrument into a wireless telephone and communicate with the operator on the approaching ship. The instrument may also be used to transmit messages between ships that are passing each other or that are working or traveling together.

In addition to being placed upon ships, these fog-signal stations are intended to be installed at danger points along shore, upon piers and rock pinnacles. Especially would this system be of value to vessels entering or leav-

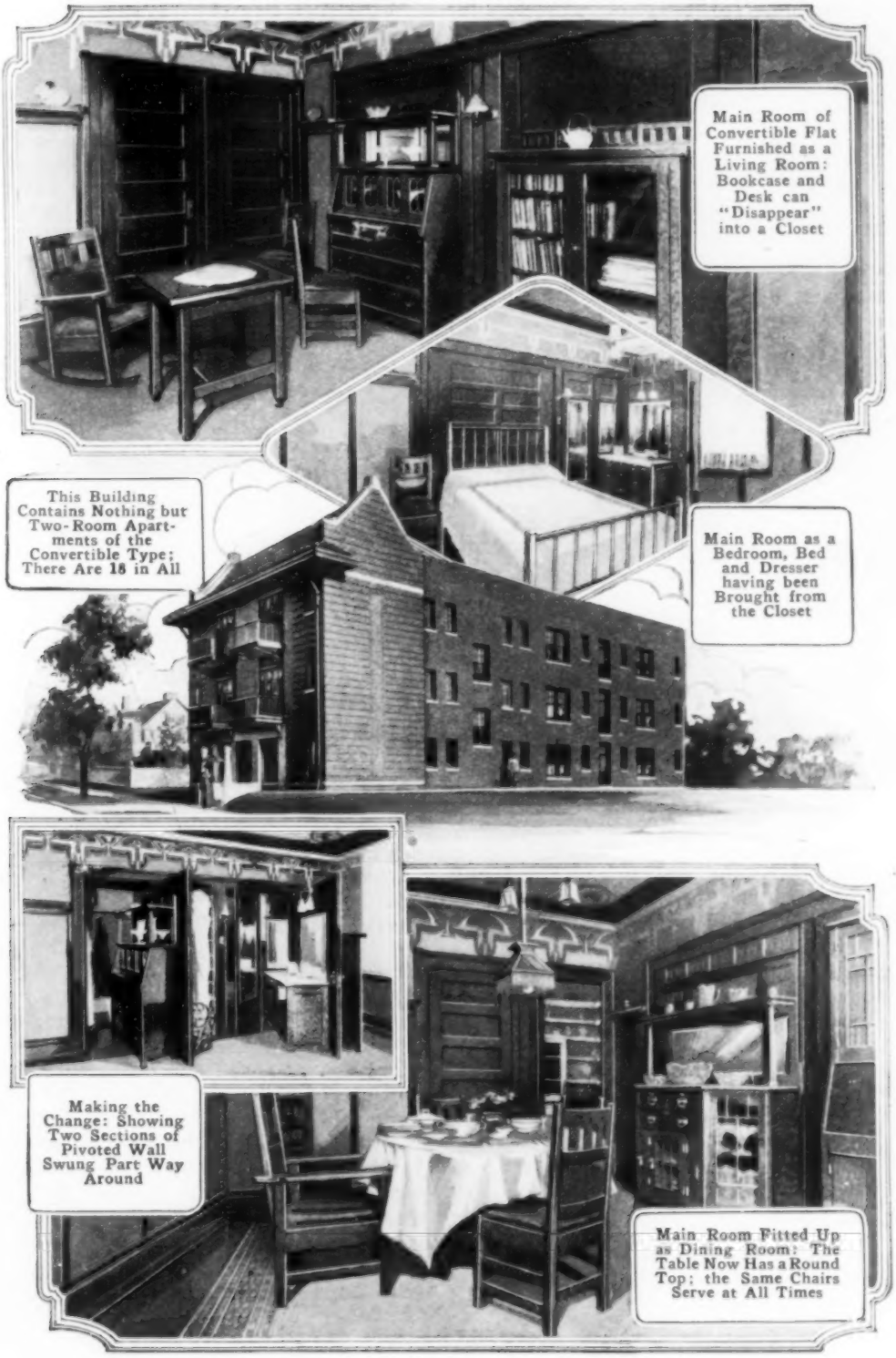
ing a harbor during a storm or fog. The instruments along shore lines or at the ends of breakwaters could, by the use of a conveniently located gauge, have their ranges limited to the outer edges of the main channel. The apparatus on incoming and outgoing boats would catch no sound from these devices so long as the vessel remained in the proper channel, but the moment they deviated from it the receiver would catch the warning waves. The direction from which the signals emanate is indicated by different tones and dashes.

The waves of the devices are immune against interference by the apparatus of existing wireless stations. This would be a valuable feature in case of war, for the officers of different boats equipped with this low-frequency system could converse without danger of their messages being detected. Furthermore, to communicate with land stations, using the present type of apparatus, it would only be necessary to make a slight adjustment, and Marconi or other messages could be received and sent with the fog-signal installation. In this new system no spark is employed. It is this fact that makes it so simple and different from others. There is no spark nor arc to adjust, and no trouble from static electricity to be encountered. Atmospheric conditions have no effect upon the operation of the outfit. Storms that would make it impossible for vibrations from ordinary wireless stations to reach their destination would not interrupt this new system. These points have been conclusively proved by tests made upon the Pacific Ocean.

The signaling apparatus has been investigated by prominent electrical engineers. Some of these men state that the inventor has taken up principles discarded years ago by well-known electricians and, by applying them in his own way, has achieved success.

APARTMENT HOUSES WITH "CONDENSED" FLATS

Many builders of apartment houses in large cities are now erecting structures composed exclusively of convertible apartments, because this modern form of family abode takes up less space than the ordinary flat, and hence can be rented for less. By a convertible apartment is meant one in which a single room can be adapted to two or three uses by shifting the furniture or revolving a pivoted wall. One corporation erects buildings of this character composed entirely of one of three types of flats: those having one room only, which can be altered to serve as a dining room, living room, and bedroom; two-room apartments, in which the furniture can be changed to make two bedrooms, a living room, a dining room, and a sun parlor, and three-room suites, each of which can serve as seven rooms, counting day and night uses. Each apartment has a kitchenette and a bathroom which are not convertible. The main room in each group is, on the average, 12 or 13 ft. square, with practically the whole of one wall divided into two revolvable sections; to one side of this wall is fastened a bookcase and sideboard; to the other is fastened a dresser and folding bed. These articles are screwed to the wall just high enough to pass over the rugs as the partition revolves. The closet into which the unused furniture disappears is roomy and has outside windows or is ventilated mechanically. Convertible and disappearing furniture gives the rooms adjoining the main room their dual character. To change the main room into a bedroom requires only two or three minutes. To make the dining room into a living room the round top of the table is removed and placed on hooks on the under side of the bed. This leaves the table with a small square top, making it suitable for a living room. The same chairs serve on all occasions. The three-room apartment covers 680 sq. ft. and renders the service of seven rooms occupying 1,485 square feet.



Main Room of Convertible Flat Furnished as a Living Room: Bookcase and Desk can "Disappear" into a Closet

This Building Contains Nothing but Two-Room Apartments of the Convertible Type; There Are 18 in All

Main Room as a Bedroom, Bed and Dresser having been Brought from the Closet

Making the Change: Showing Two Sections of Pivoted Wall Swung Part Way Around

Main Room Fitted Up as Dining Room: The Table Now Has a Round Top; the Same Chairs Serve at All Times

STOUT AND THIN CUSTOMERS USE SPECIAL MIRRORS

A dealer in wearing apparel, noticing that his stout customers and his very thin customers often were sensitive as to their figures, endeavored in various ways to render these physical characteristics as inconspicuous as possible while such persons were trying on garments. At first he experimented with various types of illumination, but was unsuccessful. He then installed two full-length mirrors of special design. One was slightly concave and the other slightly convex. When a stout customer tried on a suit she was led to the concave mirror for self-inspection and was able to see her figure as it would appear with its measurements reduced. When a thin person came in to try on clothes she was taken to the convex mirror, where the opposite effect was produced.

Concave Mirror Installed by a Dealer in Wearing Apparel for Use of Stout Customers, Who would Appear Less Stout in Its Reflection

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¶ District weather forecasters hereafter will issue warnings of conditions that are favorable to the inception and spread of forest fires.

TEXAS CITY CONSTRUCTS SEWERS OF CONCRETE

Because of the prevailing high prices of steel and the uncertainty of its delivery, contractors in many parts of the country are using concrete as a substitute where possible. The city of Austin, Tex., is replacing a number of bridges and several thousand dollars' worth of storm sewers which were damaged by 1915 floods with concrete construction. The new concrete storm sewers have 8, 9, and 10-ft. semicircular arches. Since they are laid in the parkway or under the sidewalk, they do not carry heavy street loads except at the street and alley intersections. There, instead of plain concrete, the arch is reinforced with longitudinal and vertical bars. Austin is also using concrete pipe for its small sewers.

ARMORED CARS USED LITTLE BY INTRENCHED ARMIES

The past year has witnessed a marked change in the relative importance of the armored automobile as an adjunct to the armies of Europe. Large bodies of troops when engaged in rapid and extensive movements found the armored cars of great use, and the vehicles made an excelleat record for a time, but as soon as the forces "dug themselves in" there remained comparatively little use for these heavily shielded motors. However, ammunition and supply cars that have to go to the front are now frequently armored, though the only weapons which are carried for their defense, ordinarily, are the rifles of the guards.

ECONOMIC FLOOD CONTROL THE NATION'S PROBLEM

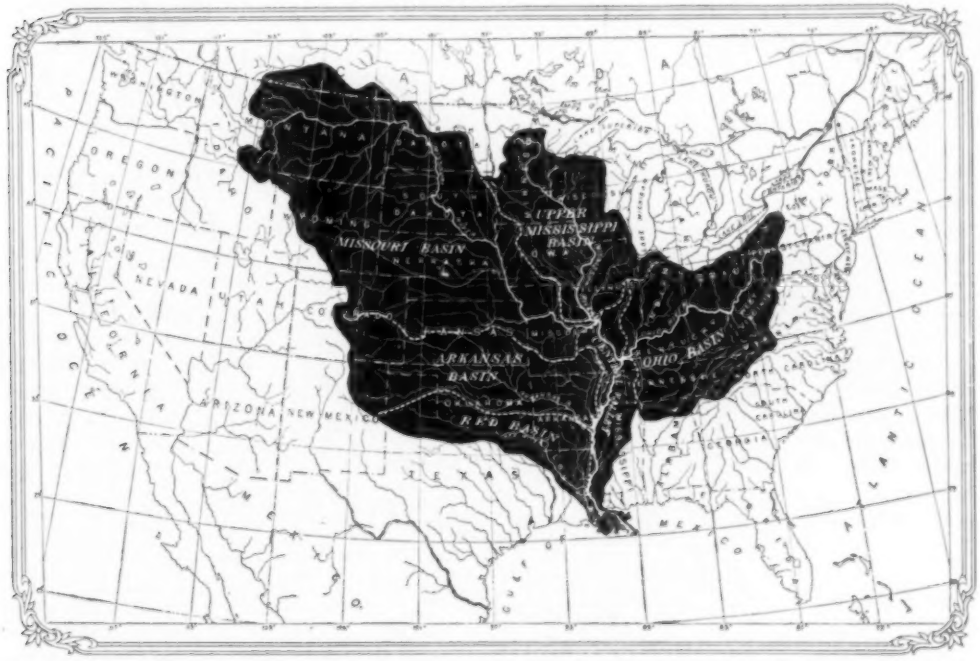
By SEARLE HENDEE

FOR 4,000 years, or more, mankind has wrestled almost incessantly with the flood problem. To prevent rivers from bursting their banks, inundating the land, ruining crops, destroying cities, and claiming human lives is one of civilization's oldest endeavors. And yet, during February, 1916, the South experienced another of its devastating deluges.

The floods of the lower Mississippi Valley are as old as the waterway itself, and becoming more costly year after year as this rich delta region is developed. So commonplace has the inundation of the valley become that it no longer possesses especial news value and therefore receives little more than passing attention by the press of the East, North, and West except on those occasions when conditions are extraordinary and affect the whole country.

The flood zone of the alluvial region is as great as the combined areas of Vermont, New Hampshire, New Jersey, and Connecticut. During the spring of 1912, when the levees broke, more than 12,000 square miles of land, an area as great as that of Switzerland, was converted into a veritable sea. Some of this delta land is almost unequaled in fertility. A large part of it is at present nonproductive because of the ravages of the river. Elsewhere crops are grown during the years when the existing levees hold, and lost when they break. Usually the overflow comes too late to permit replanting.

There is considerable confusion in the popular mind regarding the causes of these floods. And because of this, numerous schemes for controlling or preventing them, some of which when considered alone are flagrantly im-



That Portion of the Country Appearing in Black on This Map Constitutes the Drainage Basin of the Mississippi. Millions of Acres of Land in the Lower Valley are Inundated When the Storm Waters of This Vast Territory Sweep toward the Gulf

A Countryside Rally After a Break Occurred in the Inadequate Levee System near Muscatine, Iowa, Last Muskrat Holes. When a Weakened Place Gave Way an Alarm was Sounded and Some 400 Men Turned Embankment. This Saved Hundreds of Homes and Thousands of Acres of Land from Inundation.

practicable, have been advocated. One thing which is only partly appreciated, and yet most evident, is that the damage in the flood-zone states is worked by waters flowing in from territory removed from them. It is the storm waters of some 31 states, constituting the drainage basin of the Mississippi, that pour into the lower part of the river and inundate different sections of the delta country extending from Cape Girardeau in Missouri to the mouth of the stream.

Iron Mountain Passenger Train Approaching Snow Lake, Arkansas, with Tracks Three Feet under Water: A Common Sight in Certain Parts of South Where Floods have Cost Railways Millions

Much has been said about the relation between forests and floods. There is an impression that the cutting of our timbered areas has been directly responsible for the serious deluges of recent years. It is reasoned that under normal conditions the humus formed by decayed leaves absorbs large quantities of water during heavy downpours and thus prevents excessive drainage into the rivers, while the heavy blanket of snow in the North melts gradually when protected by trees, but produces floods when unshielded from the direct rays

Spring: Men had Slaved for Days, Endeavoring to Strengthen and Heighten Dikes That were Undermined by Out to Fight the Flood. A Half Mile Inland and Extending Parallel with the River There Is a Railroad Gangs Worked Day and Night to Dam a Bridged Gap in This Wall. This Shows Them at Work

of the sun. For these reasons reforestation is strongly advocated by many as one of the most feasible ways of obtaining flood control.

The argument on its face appears fairly reasonable, but there is another side to it. In the first place our history does not bear out the contention that forests prevent floods. At the time of the Rebellion we had vast timbered areas, but regardless of this some of the worst floods the valley has ever known occurred between 1858 and 1867, according to government records. Furthermore, we have authentic data describing heavy floods as far back as 1718.

Estimates made by the Mississippi River Commission also show that a forest reservation of 566,000 square miles would only ameliorate conditions slightly at best, and would not by any means render other safeguarding measures unnecessary. The value of a scheme which would convert Illinois, Indiana, Wisconsin, North and South Dakota, Montana,

In the Flood Zone Washouts and Wrecks Are by No Means Uncommon. At Dubuque, Iowa, a Few Months Ago, Water Undermined a Roadbed with the Disastrous Result Indicated by This Photograph

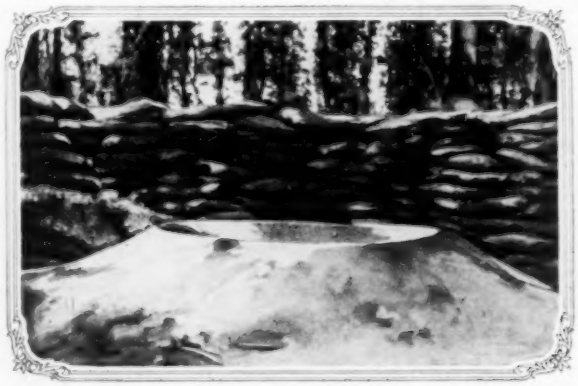
Wyoming, and Minnesota into a gigantic forest and then only partly relieve the situation, is questionable to say the least. Furthermore, years of time and labor would be required to establish so great a wilderness as would be needed, while conditions justify immediate remedies.

On the other hand there is a plan for the construction of impounding reservoirs, to hold back the flood waters and enable their use for irrigation and power purposes and the improvement of the rivers during their periods of low water. It is argued that floods should be handled from the sources of the various tributaries, rather than by building levees along the lower extremity of the Mississippi. This method has nearly as many adherents as that of reforestation, and if feasible from an engineering and economic standpoint would appear rather attractive. Opponents of the plan point out several of its serious phases, however.

Another interesting observation comes from a government engineer who has studied this phase of the river question probably more than anybody else in America. He asserts that to have retained the 1912 flood within its banks at Cairo, Ill., by this method, a reservoir having an average depth of 15 ft. and a surface area of 7,000 square miles would have been required. To construct such a work in that locality would cost upward of $100,000,000,000—a figure so tremendous as to put such a project in the class of grotesque absurdities.

It seems quite reasonable that the construction of an additional outlet or two would materially assist the river in carrying off its surplus volume of water and thus enable it to remain within its banks during crucial periods. The plan is one which has long been advocated, but like all of the schemes so far advanced, it has its opponents. Such a plan if carried out would probably reduce levee heights and lessen river depths. The latter might prove very undesirable because of its possible influence upon navigation. One of the major difficulties, however, would come in controlling such an outlet and preventing the main stream from being diverted into it. This misfortune might occur if the velocity of the flow were greater in the outlet than in the river itself. Then, too, there is plenty of evidence to support the theory that the channel would be filled with silt were the current enough slower than that of the river to remove the danger of the latter changing its course. Aside from both of these points, it is clear that any artificial outlet that might be constructed would have to be leveed to a height corresponding to that of the main stream.

Somewhat akin to this plan is that of cutting off the bends of the rivers so as to decrease resistance and permit a more direct and rapid discharge of the water. This would be done continuously from the mouth to the uppermost point where relief is needed. From one point of view this sounds sensible. Certain engineers, however, take a strongly opposing stand and reason that in thus straightening a section the distance would be shortened and the fall increased. As a result the flood height would be lowered at the upper end of a cut and increased a corresponding amount at the lower end.



One of the Reasons Levees Break: A Sand Boil, the Result of Faulty Construction, Caused by Water Forcing Its Way through a Stratum of Fine Sand Underlying the Embankment

Most of those who ob-

Sandbags, the Universal and Costly Substitute for Permanent Flood Preparedness, being Filled to Strengthen Dangerous Points along the Menominee River near Marinette, Wisconsin

Showing the Flood beyond Control Rushing over the Lower Dam between Marinette, Wisconsin, and Menominee, Michigan, doing Serious Damage to the Pulp Mill Pictured in the Background

Reinforcing the Crumbling River Banks with Sandbags. Had It Not Been for Such Measures, Greater Damage along the Shore would have Resulted

Dynamite was Used Here to Clear Obstructions and Permit This Channel to Carry Off Some of the Surplus Water Which was Threatening to Destroy a Number of Pulp Mills

ject to all of the foregoing schemes of flood control believe that a comprehensive levee system offers the simplest, most economical, and surest means of coping with the Mississippi problem. And as might be expected, most of those who advocate reservoirs, reforestation, or one of the other schemes, bitterly oppose this one.

Pending before the senate at the time of this writing is the Humphreys bill, which seeks to appropriate some $45,000,000 and provide by taxation an additional $15,000,000, the aggregate to be used in finishing the Mississippi levee system. The supporters of this measure contend that it provides for flood control. And they argue that the problem of curbing the river, which drains nearly half of the area of the country, is a national one. The latter viewpoint is being conceded quite generally, but because of the difference of opinion regarding the value of levees, the measure has many antagonists.

We come to the so-called comprehensive plan for flood protection which amounts to a proposal that the question be handled in a broad, thorough manner and settled once and forever. The Mississippi River and all of its tributaries, according to this scheme, would be taken as a unit, removed from politics and placed under the control of a Federal commission, as was done in the case of the Panama Canal. This could be accomplished by congress, which at the same time would set up a well-defined policy and establish a continuing fund to insure it being carried out and maintained.

All of the rivers would be handled from their sources to their mouths in whatever manner best fitted the general method of control. The present levee system would be completed, and standardized from one end to the other, and thenceforth intelligently maintained. To guard it and the river, the banks would be protected with revetments. This would prevent them from caving and compel the stream to maintain its present course. Furthermore source stream control—which amounts to the establishment of reservoirs along the upper reaches of the various rivers—would be worked out so as to conserve some of the surplus water, in the regions where it can be done safely and economically, for power and irrigation purposes and to somewhat lower the crest of the floods.

This briefly recites some of the numerous flood-control plans that have been advanced. None of them is new, nor is it probable that the next decade or so will bring forth any scheme unthought of during the past 4,000 years.

GOPHERS KILLED WITH AUTOMOBILE FUMES

Using automobiles as gopher-killing machines is the novel service to which cars have been put by Oregon farmers who have set about to kill gophers, and other burrowing animals that damage their crops. A car, preferably one that is light, is driven into the field where the gophers live. The engine is allowed to continue running and one end of a hose is attached to the exhaust while the other end is inserted in a gopher hole and packed about with a cloth and a little dirt. In a short time the fumes penetrate the various passages and issue from other holes. These are then plugged up; after this has been done the gases penetrate to the remotest chamber, and the inhabitants are suffocated. In a recent test a badly infested area of between two and three acres was ridden of gophers by the use of 20 cents worth of gasoline in this manner. The fact that no holes were reopened proved its effectiveness.

Filling Gopher Holes with Fumes from an Automobile Exhaust Quickly Kills the Animals Hidden Underground

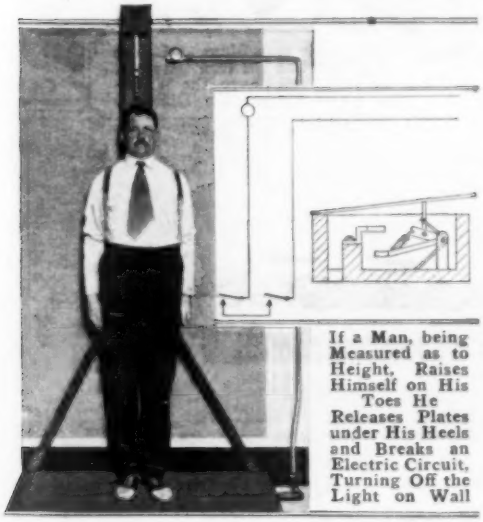
BEARS CAPTURED WITH AID OF SWEETENED WATER

While a small circus was playing towns in California some time ago, three of its trained bears walked through the unbarred doorway of their cage one morning and proceeded along the countryside, much to the alarm of the populace. Although they had been frightened by the sting of bird shot fired from the shotguns of their observers, the animals were captured single-handedly and with comparative ease by one of the showmen. In the regular act the bears are accustomed to drink sweetened water from long-necked bottles. With this in mind the showman placed a number of flasks of the liquor in a motor car and pursued the fugitive trio. After some little persuasion he succeeded in enticing the bears into the tonneau where they spied the store of bottles and commenced consuming their contents while the car was driven back to the circus grounds.

The Sweet Water Appeased the Bears and They Had No Objection to Returning to the Circus

MEASURING DEVICE DETECTS DECEPTION AS TO HEIGHT

A special device for measuring a person's height has been constructed for use by the civil-service commission of Philadelphia by which one can instantly detect any effort on the part of the person being examined to exaggerate his height. Applicants for positions in certain municipal departments are required to stand on a slightly raised platform which is part of the measuring device, and place their backs against an upright standard on which is a graduated scale and from which projects a movable marker that rests on the head of the applicant. In assuming the proper position the man being measured rests his heels on two hinged plates which normally are held a little above the platform by springs; weight on these plates presses them down so that they complete an electric circuit which lights a lamp projecting from the wall. If the applicant tries to deceive the inspector by raising himself a little on his toes the act will be instantly revealed by the fact that the light is not burning because one or both plates under the heels have been released and consequently the circuit has been broken. There is little in the mechanism to get out of order.



If a Man, being Measured as to Height, Raises Himself on His Toes He Releases Plates under His Heels and Breaks an Electric Circuit, Turning Off the Light on Wall

SALVAGING OF THE PRIZE SHIP "WALKÜRE"

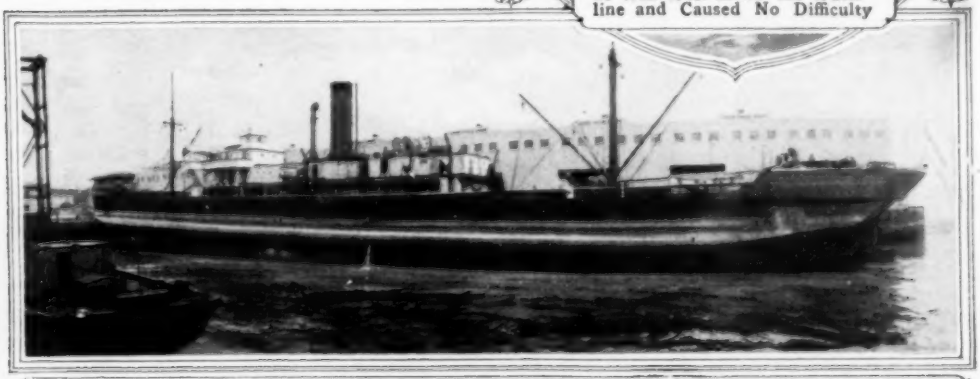
After being seized by the French as a prize and later sunk in the harbor at Papeete when that port was bombarded early in the war, the German steamship "Walküre" is again in service, this time registered as the "Republic." Its restoration was a highly profitable undertaking and constitutes an unusual story of ship salvaging.

It will be remembered that while the Tahitian port was being shelled by German cruisers in September, 1914, the defenders opened the "Walküre's" sea cocks in order to prevent its recapture. Before it sank, however, it was hit, but only slightly damaged, by several projectiles ostensibly intended for the disarmed French gunboat "Zelee" which was anchored close by. It rested on the bottom until finally sold to a San Francisco firm, which bid it in for the mere pittance of $29,000 more than a year later.

The ship was raised without difficulty, hastily overhauled and made water-tight, loaded with a cargo consisting partly of copra and nitrate, and taken to San Francisco under its own steam. The profit from the nitrate cargo alone, which was only a third of the whole load, was sufficient to offset the purchase price and salvaging cost of the vessel. Inspection showed the steamer to be in remarkably good condition when it reached America, even the woodwork of the superstructure being well preserved and still serviceable.

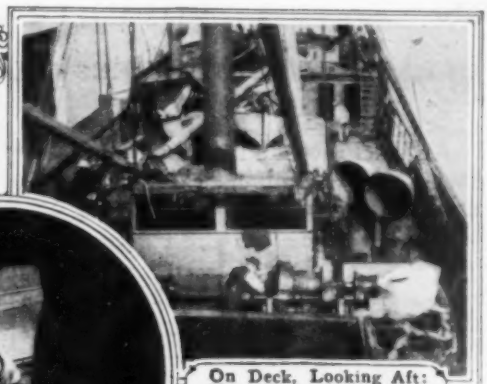
While it was undergoing a hasty but general overhauling by gangs of shipwrights at San Francisco, the owners of the steamer received numerous large offers for its purchase. Owing to the serious shortage of bottoms, shippers were willing to pay almost anything within reason to get it. It was sold for approximately $1,000,000, nearly all of which represented net profit. The vessel is a steel "half whaleback," about 300 ft. long, and powered with reciprocating engines. Its odd hull design is typical of certain old French warships and some Scandinavian freighters.

This Hole was Plugged Before the Ship Put Off from Papeete. It Was Well above the Waterline and Caused No Difficulty



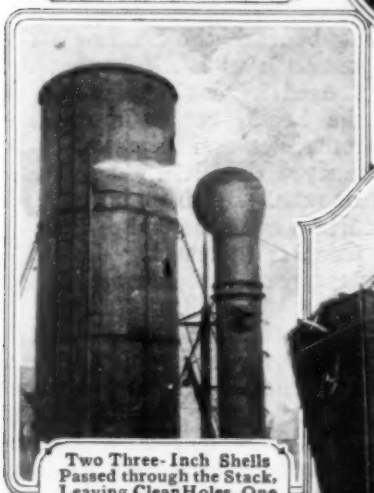
The "Republic," Formerly the German Steamship "Walküre," Docked at San Francisco After being Raised and Brought to Port under Its Own Steam from the Society Islands. The Vessel was Captured by the French and Subsequently Sunk in the Harbor at Papeete When the Latter was Bombarded Early in the War

This Photograph was Taken between Decks and Shows How the Smokestack was Honeycombed by Shrapnel. Only One Shell Did Real Damage to the Vessel



On Deck, Looking Aft: This Gives One Some Idea of the Fair Condition in Which the Superstructure was Found After the Ship had been Raised and Brought to America

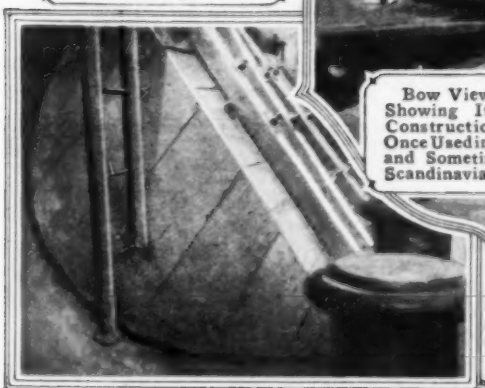
Large Aperture Smashed in One of the Cabin Walls by a Projectile



Two Three-Inch Shells Passed through the Stack, Leaving Clean Holes. One Perforation Is Plainly Seen near the Middle; Another Is Above at the Right

This Shows What Happened When a Small Shell Struck the Gunwale Nearly Amidships. The Steel Plates, It will be Observed, were Torn Peculiarly

Bow View of Vessel Showing Its Odd Hull Construction, a Design Once Used in French Navy and Sometimes Seen in Scandinavian Freighters

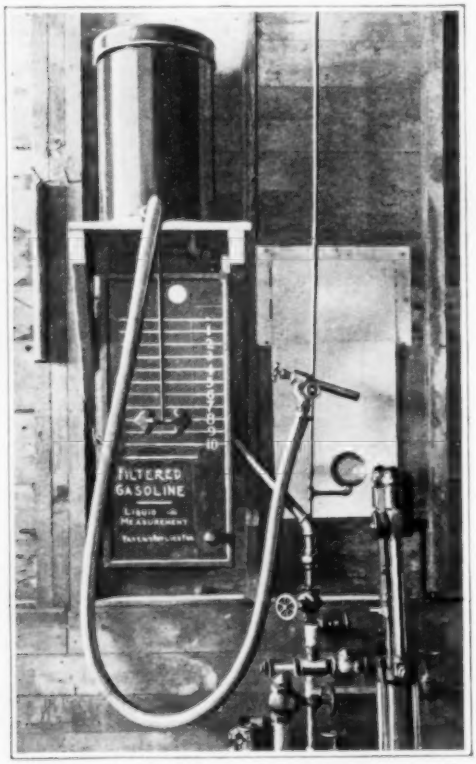


The Big Wood and Cement Plug with Which the Four-Foot Hole near the Stern was Closed Until Permanent Repairs could be Made. It Was 6 by 10 Feet in Size and Held in Place by Long Bolts

A Fragment of a Shell, Which Burst Somewhere Below, Supposedly Tore This Ragged Hole in the Steel Deck. It is Doubtful Whether Anything Larger than Three-Inch Projectiles Hit the Ship

GARAGE TANK MEASURES OIL ACCURATELY

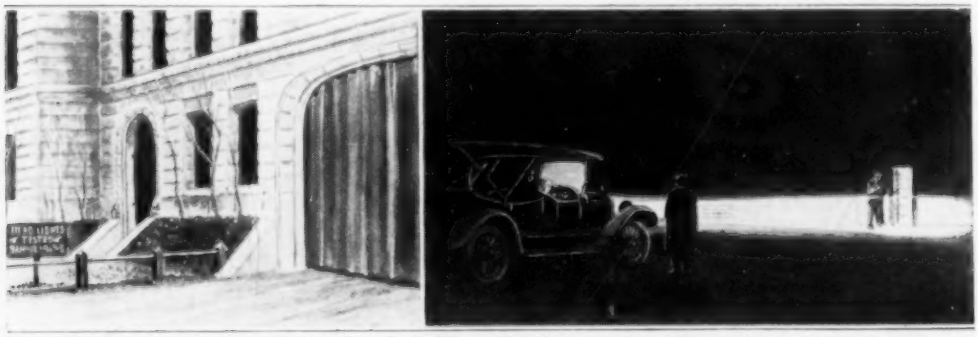
An accurate and simple device for measuring gasoline, which was constructed by a garage owner in Vermont, consists of a 10-gal. tank in which there is a float; the latter is attached to a pointer that rises and falls in front of a graduated scale as the contents of the can is decreased and increased. The reservoir is filled by means of air pressure, though other power, or gravity, can be used with an altered arrangement. In filling it the flow is controlled by a valve on the intake pipe. A customer, desiring to fuel his machine, simply connects his oil tank with the 10-gal. reservoir by means of a hose provided, and observes the flow by the movement of the marker.



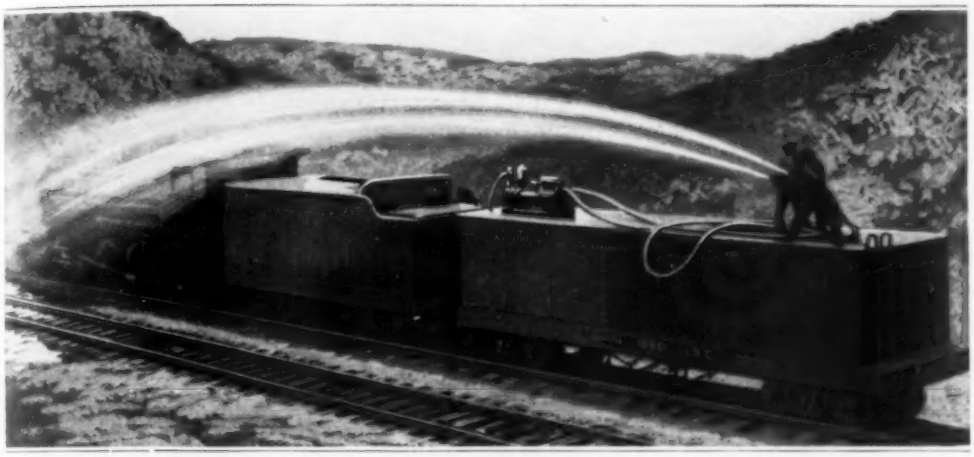
A Convenient Gasoline Tank from Which Gasoline can be Drawn Easily and Accurately Measured at the Same Time

CITY HALL'S TUNNEL USED TO TEST MOTOR LIGHTS

Running beneath the St. Louis city hall at ground level is a tunnel which has been used as a shadow box for testing the headlights of more than 5,000 automobiles and adjusting them in conformity with that city's new antiglare ordinance. By dropping a black canvas curtain over one end of the tunnel the place is thoroughly darkened. The law requires that the main shaft of light from headlights shall not be higher than 3 ft. from the ground, 75 ft. in front of the car. In this darkened passageway the lights are directed against a board surface, measuring 6 ft. high and 4 ft. wide, painted white, and framed in black curtains. By means of a graduated scale an officer judges the direction and intensity of the lights and adjusts and tilts them until the main rays fall on the 3-ft. line. When all is satisfactory a seal is affixed to the car, showing that the owner has complied with the law.



Tunnel Running under the St. Louis City Hall Where Headlights of More Than 5,000 Cars have been Tested and Adjusted to Comply with an Antiglare Ordinance



This Fire-Fighting Outfit for Use on a Canadian Railroad Includes a Tank with a Capacity of 10,000 Gallons and a 10-Inch Fire Pump Driven by Steam

FIRE-FIGHTING APPARATUS FOR USE ON RAILROADS

Believing that the municipal fire-fighting facilities of the various communities through which its line passes are inadequate to protect its property, a Canadian transcontinental railway has built a fire-fighting apparatus of its own, designed to be hurried by locomotive to any scene of conflagration along its route. The outfit consists of an engine and tender coupled to a flat car carrying a tank having a capacity of 10,000 gal. of water. On the roof of the tank is a 10-in. steam-driven duplex fire pump with a capacity of 300 gal. per minute. Steam for the pump is supplied from the locomotive's car heater. By setting the latter's regulator at 120 lb. per square inch a water pressure of 100 lb. is secured at the nozzle. In a recent test the apparatus threw two streams about one hundred feet. One man is required to regulate the pump and two to operate the nozzles.

¶The United States Hydrographic Office is making such progress in reproducing by photolithographic process the British admiralty, and other foreign, nautical charts that soon American vessels will be independent of foreign chart makers.

PISTOL MOUNTED IN HELMET DEFENDS POLICEMAN

For policemen, soldiers, and others whose lives often depend upon the quickest kind of clever gun play, a firearm of a distinctly new sort has been patented. It is of unusual form and is not without humorous phases, although ingenious. It consists of a

When the Quick Use of a Gun Is Imperative, as Here, the Helmet Revolver Offers a Policeman a Chance to Save Himself

special type of automatic revolver mounted in the crown of a two-section steel helmet, and is designed to be fired by air supplied through a tube extended to the mouth of the user. The muzzle protrudes from the front part of the headpiece, and suspended from it is a sighting device that extends down in front of the eyes. The air tube is made of a soft metal and conforms to the shape of one's face, leading from the upper part of the helmet to one side of the mouth. It is fitted with a rubber bit. Normally the tube is turned up under the visor, and when worn this way locks the gun against accidental discharge. When the wearer anticipates trouble, as in the case of a policeman making an arrest under difficulties, the tube is turned down to an operative position. The advantage claimed for the device is that it permits one to defend himself when both hands are occupied. By simply turning the head in the direction of an antagonist, the revolver is aimed at its target. The rest is easy. Means is provided for absorbing the recoil shock. The helmet is held in place by a flexible band, an apron that covers the back of the head, and a chin strap. It is understood that the weight is not excessive.

FOLDING BABY CARRIER FOR AUTOMOBILES

A new baby carrier which fastens to the rear of the front seat of an automobile should prove a great convenience for those who take the baby with them on motor trips and find it tiring to hold the child in the lap all the time. The device

Baby Carrier Hinged to Back of Motor-Car Seat: Open or Closed, as Shown, It Occupies Space Otherwise Unused

consists of a crib, with a hood, which is hinged to the back of the seat and supported by a vertical rod; between the lower end of the rod and the front seat is a coil spring. This arrangement holds the carrier firmly in place and at the same time makes it easy riding. When not in use the device can be folded down against the back of the seat into very small space.

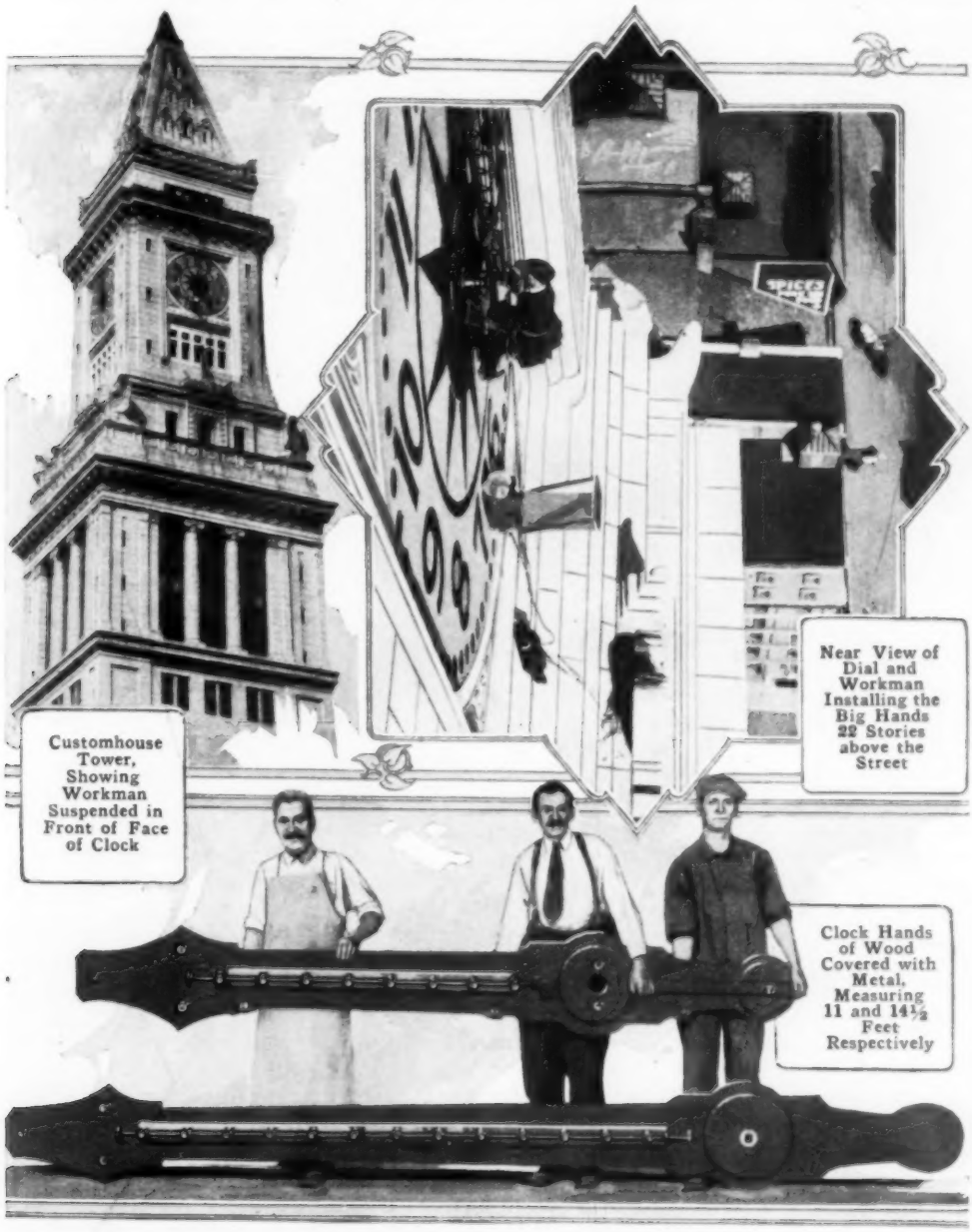
DATA REGARDING THUNDER AT SEA

While the nonmagnetic yacht "Carnegie" was making a voyage from Alaska to New Zealand some months ago, its captain made an investigation of the audibility of thunder at sea, during which he found that in only six out of 22 lightning storms was there any thunder to be heard. In these six cases the distance of the vessel from shore varied from 50 to 600 miles. In all cases where streak lightning was seen thunder was heard. In some instances in which the thunder followed lightning it was found that when the storm exceeded a distance of five miles from the ship the thunder became inaudible.

INSTALL BIG CLOCK HANDS ON LOFTY TOWER

A spectacular feat which attracted the attention of hundreds in the streets of Boston recently was the installing of the hands of the big clock in the new customhouse tower in that city. The two members are of wood, cov-

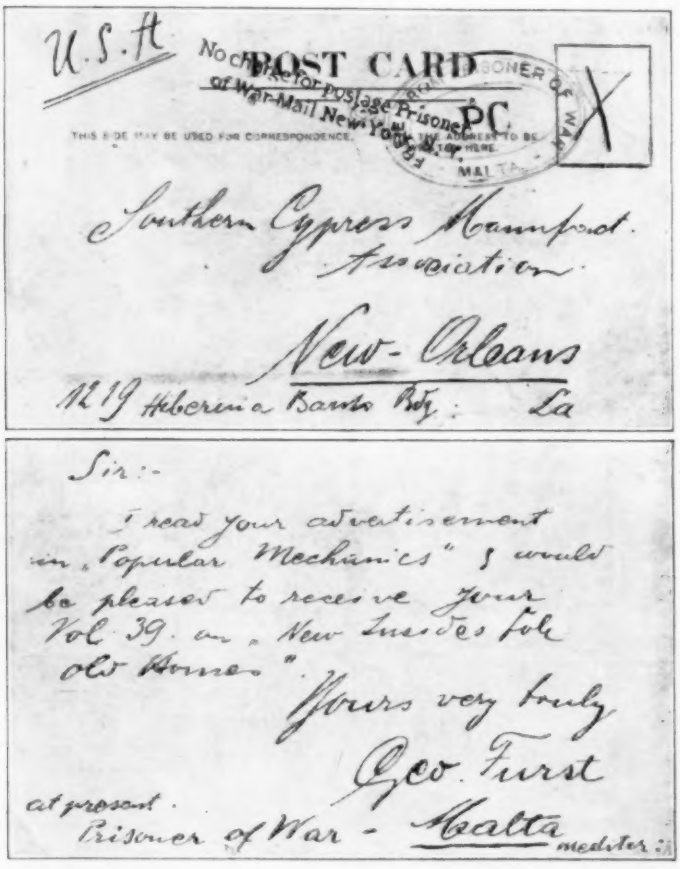
ered with metal, and together weigh over 400 pounds. It required skill and steady nerves to swing them into place, 22 stories above the street. For this purpose a workman was suspended by ropes down in front of the clock. The dial of the timepiece measures 21½ ft. across. Behind it is an electric motor which operates the hands; means for controlling this motor is situated on the second floor of the building. The estimated cost of operating the clock is $1 per day. Some delay in completing the timepiece was caused by the temporary loss of the hands while being shipped to Boston.


Customhouse Tower, Showing Workman Suspended in Front of Face of Clock
Near View of Dial and Workman Installing the Big Hands 22 Stories above the Street
Clock Hands of Wood Covered with Metal, Measuring 11 and 14½ Feet Respectively

WAR PRISONER IS READER OF POPULAR MECHANICS

There is scarcely a civilized part of the world which is not visited monthly by Popular Mechanics Magazine. This is true even in these days of war, when homes are torn asunder and towns demolished, for the magazine finds its way to the trenches on both sides of Europe, military hospitals throughout the Continent, and detention camps.

Reproduced herewith is a post card received recently by an advertiser from a prisoner of war interned by the British on the Island of Malta in the Mediterranean. It is interesting for several reasons, but particularly because it clearly reflects the thoughts of a man who has smelled powder, been captured by the enemy, and now, through long months of monotonous waiting, is anticipating the establishment of peace which will permit him to return to his home and normal pursuits. The fact that prisoners' mail is postage-free means much to the men in the detention camps.


U.S.A.
POST CARD
Director of Postage Prisoners of War Mail New York, N.Y.
PC
Southern Cypress Manufact. Association
New-Orleans
1219 Hibernia Bank Bldg: La
Sir:-
I read your advertisement in "Popular Mechanics" I would be pleased to receive your Vol. 39. on "New Inventions for the Home".
Yours very truly
Geo. Furst
at present.
Prisoner of War - Malta

Post Card Mailed by a Prisoner of War at Malta in Reply to an Advertisement Appearing in Popular Mechanics Magazine

This man is either a German or an Austrian, but probably the latter. The copy of the magazine, in which he read the advertisement referred to, is possibly one of a great number which, in response to a request, was turned over to the American Red Cross Society soon after the opening of hostilities abroad. These magazines were distributed in various parts of Europe for the benefit of the soldiers. It is likely that some of them reached Malta, although it is also possible that the one in question was sent by friends from the Continent or given out by one of the several subscribers residing in the islands.

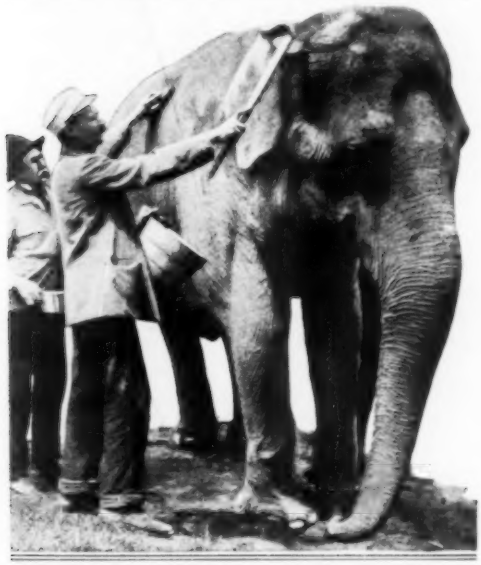
QUICK-LUNCH COUNTERS ON WARSHIPS

The "quick-lunch" method of serving meals, so familiar in American cities, has been tried out on the U. S. S. "New York," and the experiment has met with such success that the system may be extended to the entire American fleet. Before the vessel left New York City last winter it added enough trays, bowls, and other dishes to its equipment to serve 120 men at once in the quick-lunch way. In previous

plans to simplify the problem of serving meals on battleships long waits in line and the long distances which some of the men had to travel to reach the tables were considered as serious obstacles. Under the present plan, food stations have been established in various parts of the vessel, an arrangement which has overcome those difficulties.

KEEPERS MASSAGE ELEPHANT WITH OLIVE OIL

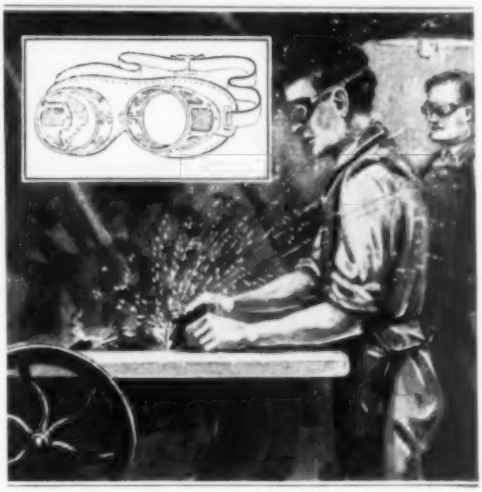
Two big buckets of olive oil constitute the toilet lotion used in giving "Nellie," the elephant in the Cincinnati zoölogical garden, her spring massage. This unusual treatment is considered necessary to keep the captive animal's skin in healthy condition. After confinement in steam-heated winter quarters her hide becomes hard and not infrequently cracks, causing a great deal of discomfort. The big animal thoroughly enjoys having her keepers scrub her body with oil; they apply it with big brushes attached to long sticks. A thorough application of the rather expensive fluid leaves the hide soft and pliable.



Giving Cincinnati's Elephant a Massage with Scrubbing Brushes and Several Gallons of Olive Oil

NEW SAFETY GOGGLE MADE FOR USE IN SHOPS

After a far-reaching study of both the advantages and unsatisfactory points presented in the safety goggles used by industrial workers, the Conference Board on Safety and Sanitation has developed a new type of eye shield which has a number of very sensible features. The frame is made of soft, oil-treated leather which fits the face snugly and resists the hardening action of perspiration. The metal eye cups are of generous depth, so that the lenses are held beyond the reach of one's lashes, and provided with screen-covered openings not only at the sides, as formerly, but also at the top and bottom, to permit thorough ventilation and prevent the glasses from fogging. The lenses are made of tough, optically ground glass mounted so that they may be readily removed without the use of tools. An adjustable, elastic band, that fits about the head, holds the goggles in place. Clear lenses are provided for ordinary purposes, and colored and smoked ones for special needs, such as for oxyacetylene welding and furnace tending. The history of the device is interesting. The serious objection of many workmen to the



New Goggle for Workmen in Shops and Factories: It is Designed to Overcome All of the Objections Found in Common Types

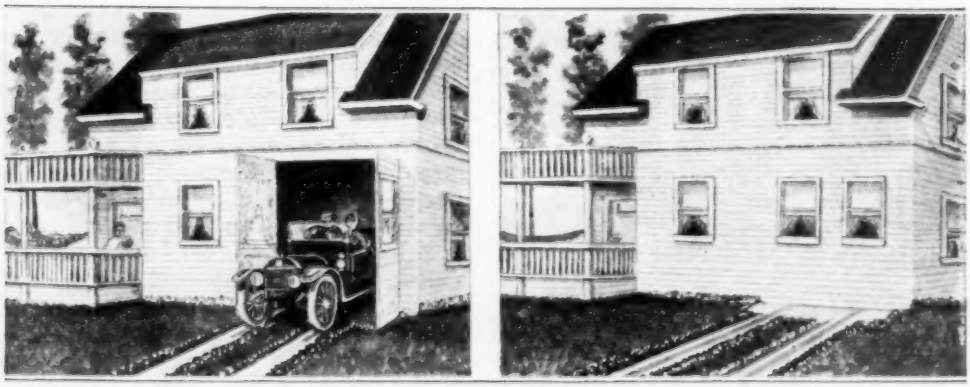
use of goggles of any existing form caused the conference board to instigate an exhaustive investigation in factories. This brought out the workman's viewpoint. Goggles of every form manufactured in America and Europe were then purchased and tried out in shops to ascertain the one best fitted for the average need. When this one was found, a lot of 10,000 was purchased, distributed, and data collected. Some liked it and others were distressed when wearing it. The reasons for both attitudes were ascertained, and the present goggles designed to present the features attractive to the average user and overcome the objections found by others. A large number of experimental samples of these was sent out to be tried and returned. It is rather significant that the conference board found it almost impossible to get back any of these goggles, the majority of the users flatly refusing to part with them.

MOTOR-CAR ROOM CONCEALED IN SUMMER RESIDENCE

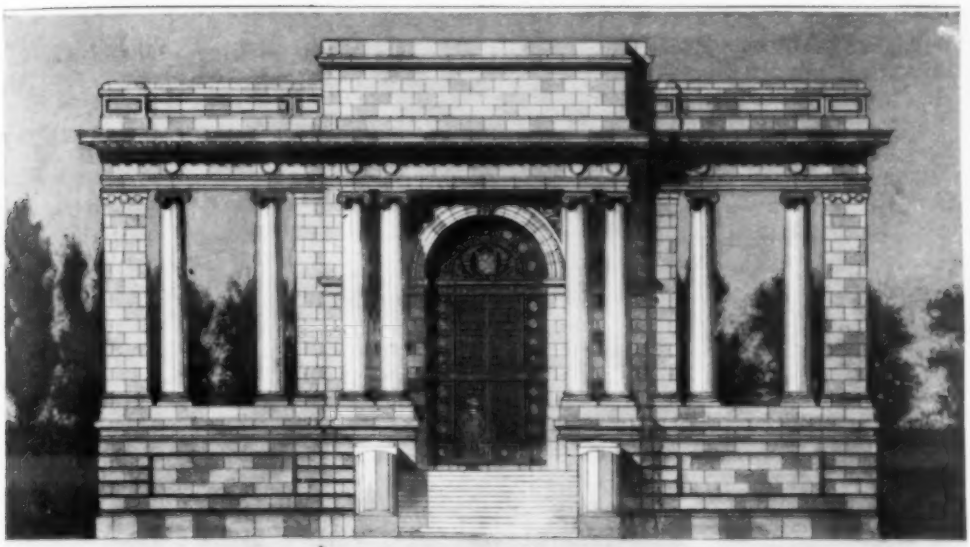
A garage, or automobile room, so constructed that the residence of which it is a part contains no outward suggestion that it includes a motor-car shelter, has been constructed as a feature of a summer home in Massachusetts. The room is practically on a level with the rest of the first floor. One of the two outer walls of the automobile room is made up of two large hinged doors which are so designed that when closed there is no indication of an entrance. By placing three windows in a row, two of them in these large doors, the suggestion of anything like a garage is made even more remote. It was, of course, almost impossible to conceal the wheel tracks leading to the doors, but long, narrow flower beds either side of them have rendered them quite inconspicuous.

DEPTHS TO WHICH WAVES DISTURB THE SEA

Laboratory experiments recently conducted by the Hydrographic Office of the Navy Department indicate that the depth to which a wave causes a disturbance is 350 times the height of the wave. For example, an ocean gale which causes waves 20 ft. high probably disturbs the sea to a depth of a mile and a third or more. Cases have been recorded in which tempests have moved the submarine cable laid across the Wyville Thomson Sill, a depression nearly 4,000 ft. below the surface of the ocean in the submarine ridge separating the basin of the northeastern Atlantic from the basin of the Norwegian Sea. The greater the depth the less is the disturbance, so that objects of considerable weight soon reach a level at which they are not easily moved from their position.



The Doors of This Automobile Room are so Constructed that When Closed They Appear to be a Part of the Wall, with Windows Opening off a Living or Dining Room



The Entrance Portico and Arch to be Erected in Front of the Hispanic Museum in New York City as a Memorial to Cervantes, the Spanish Poet and Novelist Who Died 300 Years Ago: The Gate Bears the Coats of Arms of Spain and the Spanish-American States

CERVANTES MEMORIAL TO BE ERECTED IN NEW YORK CITY

In commemoration of the death 300 years ago of Cervantes, one of the most noted novelists and poets that Spain has produced, a splendid entrance portico with a memorial arch and bronze gate, is to be erected as an architectural feature of the Hispanic Museum in New York City. The colonnade, with eight Ionic columns, will be 70 ft. wide and 50 ft. high at the center. Its general style will be in harmony with the building now standing, and it will be known as the Cervantes Gate. On either side there will be appropriate inscriptions. The gate proper which will close the archway will be 25 ft. high and 12 ft. wide. At the top it will bear the coat of arms of Spain and those of all the Spanish-American states will be set around the border. Granite and limestone will be the chief materials used.

¶Considerable fibrous asbestos is reported to have been found in South Africa which is chiefly of a golden-brown color and longer than any mineral fiber previously known.

HOSPITAL FOOD CARRIERS HEATED ELECTRICALLY

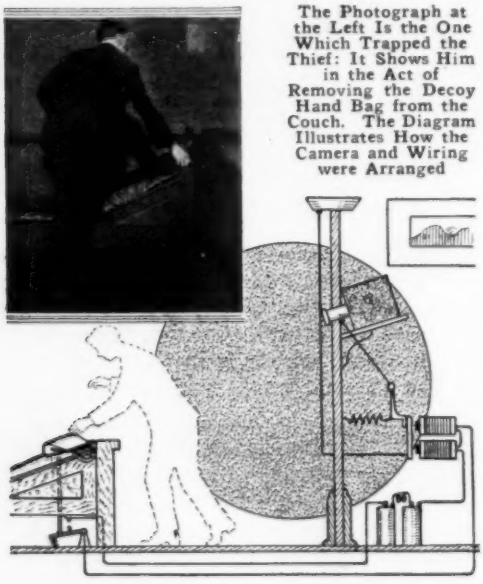
Several electrically heated food wagons have been added to the equipment of a Salt Lake City hospital for the purpose of carrying warm food from the kitchen, which is in the basement, to the various wards and rooms on the

A Food Carrier for Use in a Hospital: It is Warmed by the Electric Air Heater Shown inside the Wagon

floors above. Formerly dumb-waiters were employed, but great difficulty was experienced in keeping the food warm. These wagons are inclosed and have sliding doors which make them practically air-tight; each has seven shelves and can hold 26 trays. Mounted on the floor of the wagon is an electric air heater which can be connected with an electric circuit by means of a 10-ft. wire. An hour before mealtime the wagons are connected up with a socket and are thoroughly heated so that when food is brought to the upper floors it is warm and palatable; if all the trays are not removed at once the wagon is again connected with the electric circuit and the food kept warm.

FICTION-SLEUTH METHODS VINDICATED BY WRITER

Fiction-story methods of criminal detection were recently used with success in real life at Duluth, Minn. The



The Photograph at the Left Is the One Which Trapped the Thief: It Shows Him in the Act of Removing the Decoy Hand Bag from the Couch. The Diagram Illustrates How the Camera and Wiring were Arranged

city has a dentist who devotes some of his spare time to writing modern detective and criminal stories. His office had on several occasions been visited by a daylight thief who had purloined women's pocketbooks that had been left in the waiting room by patients while having work done. Suspicion pointed to a man who had made numerous appointments and in every instance failed to keep them. In order to catch the thief and end his operations, the writer-dentist employed magazine-detective methods. The supposed thief had made an appointment for a certain Saturday afternoon. The dentist therefore mounted a camera in an adjoining office, focusing its lenses through an aperture in the wall upon a couch in the waiting room. A pan of flash-light powder was placed in an advantageous position and concealed, while a decoy hand bag was partly hidden beneath a woman's hat on the couch. A cord fastened to the bag led to a switch arranged near the floor. From this, wires were strung to an electromagnet which was connected with a set of batteries. When this magnet was energized it attracted a small plate to which two cords were attached, one leading to the camera so as to actuate its shutter, and the other to the trigger of the flash-light gun. About the appointed time the prospective patient entered the office, saw the half-hidden hand bag, and started to pick it up. The pull he gave it actuated the switch and closed the electric circuit, igniting the flash light, operating the camera, and also ringing a bell in the dentist's private office. The explosion of the powder so startled the thief that he found himself looking down the barrel of the dentist's revolver before he could assemble his wits and escape. He was turned over to the police, who in an hour's time were furnished a photograph of the man in the act of taking the pocketbook. Subsequently the man made a complete confession.

¶ Consideration is now being given to the proposal to have members of the United States Marine Corps wear steel helmets resembling those worn by European soldiers.

GASOLINE CAR NOW USED ON TAMALPAIS RAILWAY

That picturesque outdoor resort, Mount Tamalpais, not far from San Francisco, is now ascended by an eight-wheel, 20-passenger coach driven by a 60-hp., six-cylinder gasoline engine. The wheels are small and run on a railroad track which makes an ascent of about half a mile while traversing a winding scenic route eight miles long. The new coach is designed to supplement the steam locomotive, the coach, and the four-man crew already in use on the railway, and when traffic is so light as to make it unprofitable to run a train the gasoline car will be used alone. The new carrier has a double-chain four-wheel drive; the engine, on a front truck, is supported by a subframe hung on springs. It has four speeds and is capable of 12 miles per hour. Each of the eight wheels is equipped with two brake shoes capable of ample pressure; the wheels are kept cool with water.

"Bow Knots" Made by Railway Line in Its Winding Ascent of Tamalpais

Above and Below: Views of New Gasoline Coach Used on Tamalpais Railway

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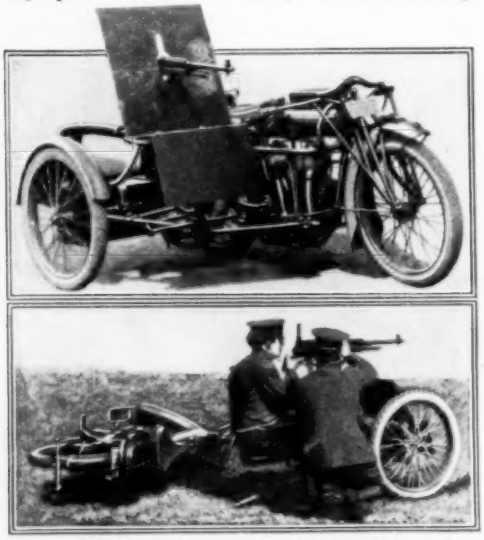
ENGLISH FIRM MAKES NEW HIGH-SPEED TOOL STEEL

A new high-speed tool steel has been produced by an English firm, which contains neither tungsten, molybdenum, nor cobalt—alloys commonly used in such steel, but of which the supply is limited. Preliminary experiments indicate that the new product possesses not only the desirable qualities of other high-speed tool steels but has the advantage of being easily produced. After the steel has been melted in an ordinary crucible furnace of high temperature it is run into metal or sand molds and cast in the form desired. When cool, without any forging or heat treatment, the tools produced are ground on an emery wheel, dry, and finished on a wet grindstone, after which they are ready for use. The firm producing this new steel claims that it can cast bars of any shape at present in use, up to 4 in. square. In an exhibition test a $1\frac{1}{4}$-in. tool of the steel was used on a chrome-nickel forging at a speed of 120 ft. per minute, cutting a depth of $\frac{3}{32}$ in. The tool ran for seven minutes before breaking down, while another, made of a well-known brand of high-speed tool steel, lasted less than three minutes. This new product, it is believed, can be put on the market at prices that will compare favorably with those of any high-speed tool steel now used.

DETACHABLE SIDECARS FOR ARMORED MOTORCYCLES

Eighteen machine guns mounted on motorcycles have been added to the equipment of the United States Army



Armored Motorcycle with Machine Gun Mounted on Sidecar is Shown Above. Below Is the Machine Gun with Its Two-Wheel Carriage Detached from Motorcycle

on the Mexican border. Because of its lightness, great mobility, and durability, this type of fieldpiece possesses certain advantages found in no other equipment. The special feature of this new machine is that the sidecar which serves as a carriage for the machine gun has two wheels instead of one; this carriage can be detached in less than a minute, after which it can be moved about by hand while the motorcycle is left free for other use. When the sidecar is attached the inner wheel is raised above the ground. The gun and the gunner, who rides on a seat just behind the piece, are protected by a shield of armor. The framework of these outfits is exceptionally heavy because it must carry not only two and sometimes three men, but also the gun, ammunition, armor plate, etc. It is claimed that a speed of 40 miles per hour can be attained on average roads.

BIG FILING CABINET FOR SEED CORN

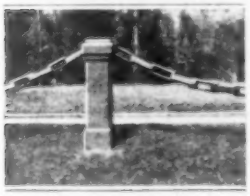
A huge filing cabinet for seed corn is the device which was used by the county agent of Black Hawk County, Iowa, during the county-wide seed-testing campaign which he instituted following a partial crop failure last year. The agent mailed requests to 5,000 rural school children in the

Storage Shelves Constructed by an Iowa County Agent to Care for Samples Sent Him during a County-Wide Seed-Corn Test

county asking them to select 100 ears of corn from their fathers' corncribs and send him kernels from those ears; the farmers themselves were also invited to send or bring sample ears. Each lot as received was labeled and a test made of its germinating powers. So great was the amount of corn tested that the walls of a large room were lined with especially constructed shelves on which thousands of ears were systematically arranged. As tests were completed the results were recorded on the proper samples and the farmers notified.

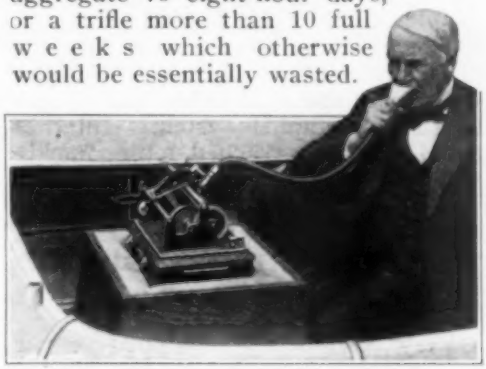
ORNAMENTAL FENCE CHAINS MADE OF WOOD

Ornamental fences that are made of wooden or concrete posts and wooden chains are becoming popular for use on residence grounds in California. The chains are composed of links made up of four pieces of pine which are screwed or nailed together. A common size for these parts is, two pieces 3 by 3 in., and two pieces 3 by 9 in. When kept well painted these chains last a long time. They are of course less expensive than heavy ornamental chains of iron or other metal.



DICTATING MACHINE USED IN EDITOR'S CAR

One of New York's prominent newspaper editors has devised an interesting as well as ingenious means of utilizing the time spent daily in traveling between his office and residence. He has installed a dictating machine in the tonneau of his motor car, and while being driven to the city in the mornings, and returning from it in the evenings, devotes himself to dictation. This procedure adds two hours, six days in the week, to his working period—or saves them, as the case may be. In a year's time such a saving would aggregate 73 eight-hour days, or a trifle more than 10 full weeks which otherwise would be essentially wasted.

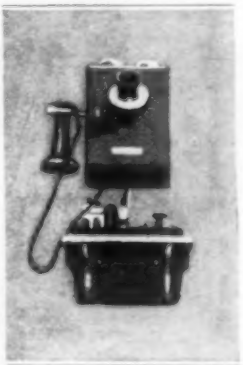


Inventor of the Talking Machine Using a Dictating Instrument Installed in the Motor Car of a New York Editor

The dictating machine rests on a cushioned box placed in front of the rear seat where it is within convenient reach. During cold months a limousine is used, and throughout the rest of the year an open car. The scheme is of significance, for it undoubtedly represents the first step toward what may eventually be a common time-saving practice among big professional and business men.

INSTALL DUAL CALL SYSTEM IN CITY HOSPITAL

Both telephone and telegraph instruments have been installed in the internes' quarters and the wards of a Cincinnati hospital. The purpose of this dual system is to facilitate the intercommunicating service and prevent what sometimes might prove to be serious delays. Each of the internes has his private call and receives general instructions from the hospital office by a simple code which he is able to translate easily with the aid of a code

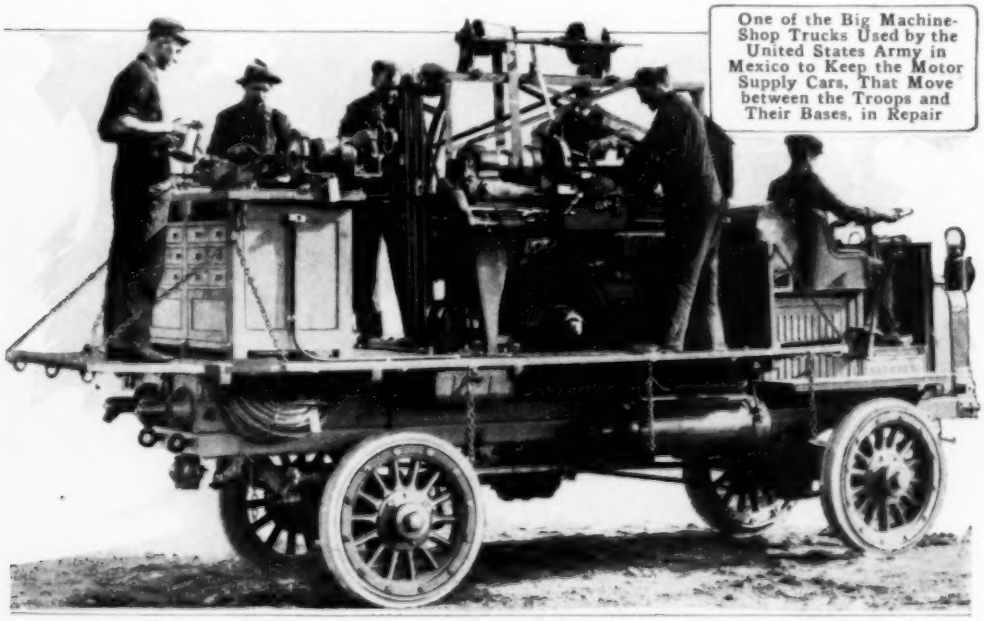


card. When he cannot be reached in his room, or in the ward where he may be supposedly engaged, a master key enables the operator to send out simultaneously more than a score of calls to all parts of the building. This latter function is one of the chief advantages of the telegraphic system. Internes usually can be reached more quickly and with less inconvenience to other attendants with this installation than by telephone. Furthermore, a call is not delayed when telephone lines are busy. Telegraph transmitters and receivers are mounted on neat shelves secured below the wall telephones and connected with the telephone wires, since both telephonic and telegraphic conversations may be held over one set of wires simultaneously.

MOBILE MACHINE SHOPS AID ARMY SUPPLY TRUCKS

Very completely equipped repair trucks are being used by the United States Army in maintaining the motor supply cars that form the backbone of the line of communication between the troops in Mexico and their bases. These machines are outfitted so that repairs of almost any kind can be made on the road and disabled trucks started on their way again without serious loss of time. Recently a fleet of special machines of this character was ordered by the War Department, and two of the number have been delivered in Mexico, where they are now in service. Each of these is equipped with a 13-in. lathe, drill press, grinder, portable drill, cabinet bench, three vises and anvils, a forge, oxyacetylene-welding outfit, and complete sets of blacksmith and machine-bench tools. The machinery installed on the trucks is operated by electricity supplied by motor-driven dynamos that also serve the lighting systems. The trucks themselves are of the four-wheel drive type and are capable of negotiating heavy roads, or sandy stretches where there are no roads.

¶ More than a million dollars has been spent by Great Britain and France since the war began for spruce lumber from Washington and Oregon, to be used in the manufacture of aeroplanes.



One of the Big Machine-Shop Trucks Used by the United States Army in Mexico to Keep the Motor Supply Cars, That Move between the Troops and Their Bases, in Repair

COMMENT AND REVIEW

NOT since the Civil War has the spirit of '76 been abroad in the land as now. The great parades in our large cities were needed to show the world, and no less ourselves, that our patriotism is only sleeping for want of an occasion to awaken it. One young man, visiting Chicago on the day of the parade and not intending to participate, on seeing the great demonstration fell in line and marched the entire distance. He remarked to me, "I felt I must declare my patriotism, and came out of the parade with an entirely new and enlarged conception of what my country has done for me, and an increased appreciation of my duty to it." The simple fact is that since the retirement of our Fourth of July orators, now a good many years remote, there had actually been nothing in his daily life to arouse patriotism. The Spanish War did to some extent, but this young man of 25 today was only a small boy then.

Preparedness Parades

To many the most impressive feature in the preparedness parade in Chicago, was not the great number, nor the large representation of women, both young and middle-aged, but rather the splendid marching. For ten hours these civilians, thousands of whom had never before marched in a public procession, swung past with even lines and correct step; and with only a few halts in all that time, and these of only a few seconds' duration. That these untrained thousands were able to do this, is at least encouraging as to what these men and women could do in case of emergency and under the instruction of a drillmaster.

Moreover, the demonstration was thoroughly democratic, as presidents of banks and captains of industry whose names are known in every state marched shoulder to shoulder with their own soldiers of industry, expressing an equal loyalty to a common cause. And every marcher carried The Flag.

IT is good for us all to find occasion thus to meet on a level in support and acknowledgment of equal rights and responsibilities. In the past, when everything was on a small scale, it was possible for the owner to be in close, daily contact with his coworkers. With the expansion of a plant from a few score workers to as many thousands this has become a physical impossibility, and quite naturally the man who regards his position as but a very small cog in a very great machine knows little of the man whose hand is on the throttle. And yet it is not the fault of the man at the top, who usually is the hardest toiler of them all, and who must work by day and plan by night to keep the enterprise intact and efficient. It becomes each therefore to be loyal, considerate, and generous to the other.

The Get-Together Spirit

Applied Patriotism

THE music of brass bands had not yet died away when the stirring notes of bugle and drum were sounding throughout the land. In response to the call of the President, the state militias began assembling and in a few hours 50,000 had reported, were ready to march, and eager for service in the Mexican crisis. This page will be on the press in a few hours, and by the time these words reach our readers the situation may have cleared, or we may be engaged in hostilities. In either event there will be unanimous support from every state. It is no pleasant task, and one long postponed, should events make it necessary, to do for Mexico what we have done for Cuba. It has never been an American trait, however, to shrink or falter at any imposed task, however unpleasant, and there will be no half-heartedness now.

The spirit of patriotism is inspiring and assuring, for on every side the response is full-hearted. Within 24 hours the Chicago Board of Trade had tendered the services of 980 men, including many experienced officers and soldiers; men of the same intrepid valor as composed the historic battery of the same source and name in the Civil War. The ladies of Pittsburgh announced completed plans to feed every soldier passing through that city, as was done all through the days of '61-64. The Red Cross reports 6,000 nurses ready for instant service. State militias sprang to full recruited strength overnight. Employers bade employes Godspeed with full pay while serving the country and their old positions awaiting their return. Organizations for the care and relief of soldiers' dependents otherwise unprovided for, during the period of service, sprang into existence, and public-spirited citizens began pouring in their donations. We have the spirit and we have the men, but there are things even more essential, which we lack. A long campaign crying "Preparedness" now finds its justification. The machine-gun companies of the Illinois National Guard assemble, and should they go to the front, must leave without a machine gun: for the entire Illinois Guard owns but two machine guns and they are in the repair shop!

Perhaps the present awakening to our puerile and utterly inexcusable condition may, providentially, result in such a strong expression of public sentiment as will turn our state and national representatives from dreams of pork barrels and personal schemes long enough to at least provide us with tools of defense. If our neighbors on the south were of equal intelligence and resource with our honored neighbors on the north, we might well be concerned during the time it will take us to properly equip our forces in the field. What then would have been our sorry plight should our difficulties have been with some one of the military nations? We have skated on thin ice long enough. Our size and wealth demand a thoroughly trained standing Army of 200,000, with a Navy in proportion, and equipment and a large supply of ammunition for 1,000,000 men, and when all this is done the relative protection will, doubtless, be less than the present police protection in any of our large cities.

JUST now the price of paper is soaring, due in part to increased cost of manufacture, but largely to demand. With improved trade conditions business men by thousands are printing catalogs and other announcements with a result that paper is selling for twice what it brought six months ago. Even at the present high prices concerns are ordering a year's supply of office stationery and envelopes, when a six-months' supply would be reasonably safe and help bring supply and demand together. A most excellent suggestion is made by George F. Lord, advertising manager of a very large company, who states that his concern had intended to double the size of their house organ with 200,000 circulation per month, but will not do so at present, in order not to further disturb the paper situation. They also have adopted half-size letterheads for all short letters, and are carrying out the same principle in all their printed matter. As Mr. Lord suggests, if all business men would adopt the same policy every purpose would be equally well served and a saving effected which would be surprising.

Wasteful Use of Paper

As the above lines were being written, some mail was laid on the desk, and the very first piece proved a glaring example of useless waste. An envelope 9 by 12 inches, made of heavy bond paper, contained a sheet of fine bristol board the same size, and a sheet of heavy, expensive paper which when unfolded spread out 18 by 24 inches. Only four of the eight pages contained any printing, and the first page, 9 by 12 inches, carried just eight words in moderate-sized type; another page contained only 23 words, and the entire text spread over four pages could easily have been printed on one page without omitting a single word. Here then were eight large pages, of which four were white paper, where one page would have answered. And the burden of the story told was that somebody had "increased his revenue" a certain per cent! And a day's mail brings to most business men an armful of paper wasted, most of which promptly finds its way into the wastebasket.

Time was when the printed page, whatever its message, was almost sacred, simply because it was printing on paper. But our children know it not.

THE Americans are world-known as a generous people. Generosity is a noble trait of which too many good things cannot be said. But wastefulness and extravagance both in personal and business life is not commendable; it is both silly and even wicked.

Extravagance Is Not Generosity

We are born into a land of wonderful resources and plenty; we have a false pride as to what we are pleased to term small things. Until daily papers sold for one cent our copper coins were disdained, and used largely for children's candy and given in change at post offices. Not so many years ago thousands of people on the Pacific coast had never even seen our copper coins. And so we have drifted merrily along, some of us bent on making a display and doing things, as we considered, "in a large way," when a

smaller way would have been fully as effective and much less expensive. It really is the same trait which leads otherwise intelligent imbeciles to use ten-dollar bills as cigar lighters. We may well learn wisdom in intelligent economy from continental Europe, without the least danger of reaching the other extreme of being stingy, and whether or not we take kindly to this lesson in economy we will be forced to do so some day. Through our shortsightedness we intensify unusual conditions and unnecessarily raise prices.

Hope for International Conciliation

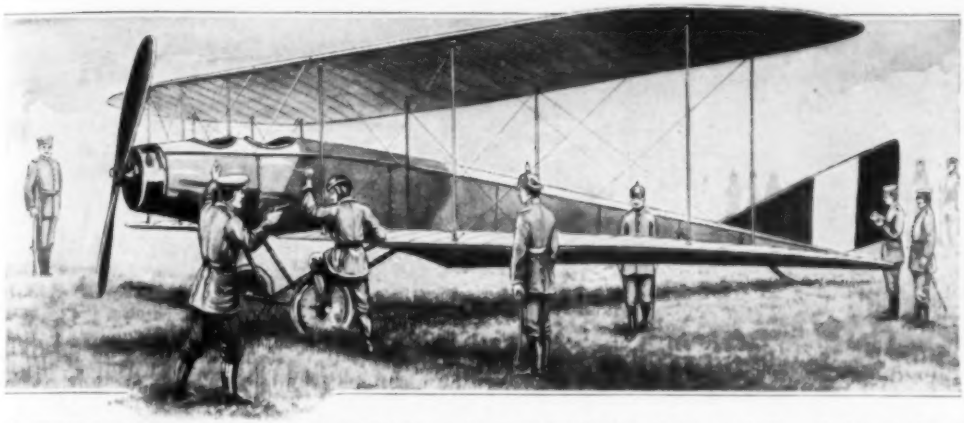
EVERY large city in the world includes in its population many residents who belong to other nations. These aliens live peaceably and transact profitable business. The United States offers an unprecedented example of the ability of representatives from every nation in the world to live side by side, and engage in trade with each other in peace and prosperity. The explanation is law which all alike must observe; and suitable officers of the law—city, county, state, and Federal—to enforce it. Disputes as to property rights are now settled by tribunals of law, and usually with justice. A man no longer suffers humiliation in submitting his case to a judge or jury where once his recourse was to sword or pistol.

Having thus brought the individual to an accepted standard of legal decision, the hope of far-sighted men is to extend this salutary, logical, and beneficent system to the disputes of nations. While this latter and larger effort is vastly more difficult of arrangement and accomplishment than the keeping of peace in villages, cities, and states, on the other hand the nations of the world were never before so intimately acquainted and connected by reason of travel, telegraphs, and exchange of commodities; nor so interdependent. The full force of this latter condition which has been the growth of the past century was but faintly, and by millions not at all, realized until the present war.

The burden of paying for the present war will not be borne by the losers alone but by the victors; and also to a considerable extent by the neutrals in all parts of the world. With heavy war taxes to pay for long years, and the repair and maintenance of navies and land defenses, it is evident an opportunity may be presented, when peace terms are being decided, to at least advance the movement to substitute law for war. Obviously, before any nation can accept this, an overwhelming majority of powerful nations must at the same time agree to it. But a start at least would be something, and hope for the future would lie in an education of the population of the dissenting countries, a lesson not unwelcome to millions just now. In the meantime we cannot afford to take chances, and must proceed with our policy of preparedness. On the question of international conciliation, however, both those who favor preparedness and those who oppose it can heartily unite. Many statesmen believe the end of the present war may offer an opportunity such as has not occurred in centuries, to secure, or at least to greatly advance, this cause.

H. H. WINDSOR.

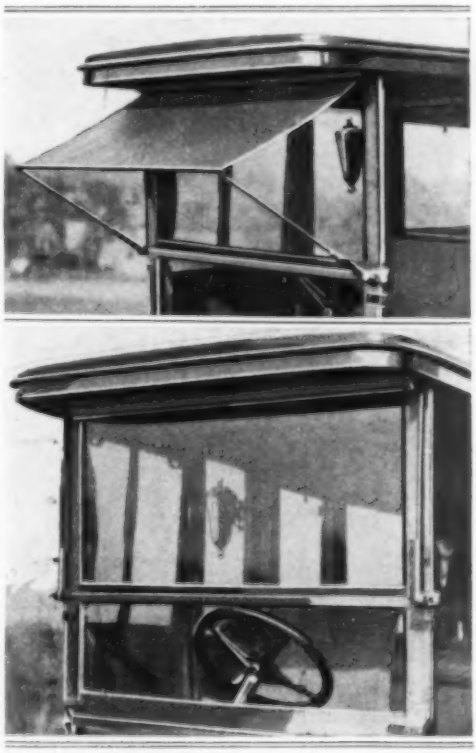
FRENCH FLIER FREES HIMSELF FROM CAPTOR IN MIDAIR



EUROPE'S airmen, since the great conflict began, have rendered most of the antebellum fiction stories of aerial warfare tame to the point of insipidity. In support of this there is the cable account of a French flier's escape from the enemy after losing his course in a fog and landing within the kaiser's lines. Upon being seized, the scout was ordered, at the point of a pistol, to fly low over the allies' trenches with an armed German officer in the observer's place. Death was to be his penalty should he signal his comrades or attempt to land. Although he was strapped to his seat, the German was not, and, realizing this, the Frenchman made a quick ascent to a fair height and suddenly turned his craft nose down. Caught without warning, the captor was hurled into the air and fell to his death, while the pilot looped the loop and returned to his field aerodrome.

MOTOR-CAR AWNING HELPFUL WHEN DRIVING IN RAIN

One of the new motor-car appliances consists of a simple, stanchly constructed awning for the windshield. The purpose of the contrivance is to prevent drops of water from blurring the glass when one is driving in a rainstorm. During the daytime trouble from this source is trying, and at night when each little spot of moisture refracts the glare of street lamps, making a windshield a confusing screen of scintillating globules, driving is often difficult. The awning is made of an opaque rubber material held by a spring roller similar to that of a window shade. Steel rods hold it in position and allow it to be adjusted to suit a chauffeur. If the speed of a car does not exceed 15 miles an hour, the awning will keep most of the windshield unspotted. But be this as it may, the device casts a shadow across the glass so that the glare of street lamps causes no interference. When used as a shade while driving against the sun in the early morning or late evening, the awning is of equal service.



The Awning is Made of an Opaque Rubber Material. It is Shown Both in Use and as It Appears When Rolled Up

MOBILIZATION OF NATIONAL GUARDSMEN

First Regiment, Illinois National Guard, Encamped at Springfield, being Sworn In for Service in Mexico before Departing for the Border

Disabled Guardsman, Halting on Way to Field Hospital to Sign Agreement to Enter Federal Service

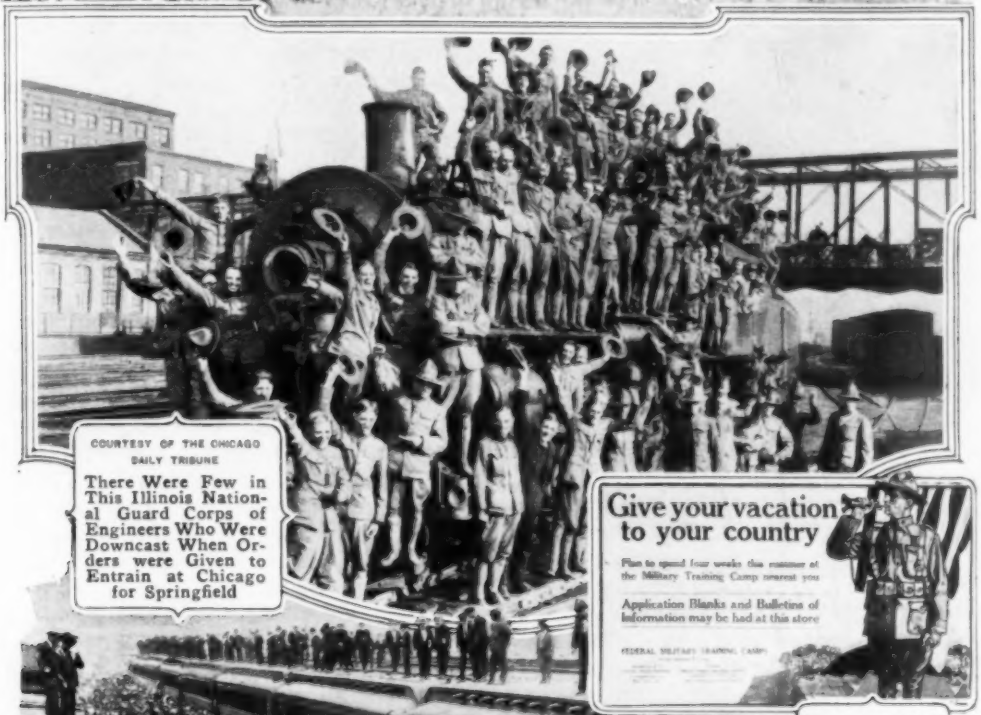
Company of New York Guardsmen, Sixty-Ninth Regiment, Marching through Streets Accompanied by Mothers, Wives, and Sweethearts. Scenes Like This were Enacted in Every City

The Result of Some Incidental Target Practice by an Enthusiastic Bugler at One of the Mobilization Camps

Large Numbers of Men and Boys Left Their Places of Employment and Rushed to Recruiting Offices When the Guardsmen were Called Out

AND ROOKIES FOR SERVICE IN MEXICO

In Texas the Spirit Ran High, Boys and Men Joining the Guard and Flocking to Camp Wilson, at Fort Sam Houston, with Such an Unexpected Rush That It Was Difficult at First to Feed Them



COURTESY OF THE CHICAGO DAILY TRIBUNE

There Were Few in This Illinois National Guard Corps of Engineers Who Were Downcast When Orders were Given to Entrain at Chicago for Springfield

Give your vacation to your country
Plan to spend four weeks this summer at the Military Training Camp nearest you
Application Blanks and Bulletins of Information may be had at this store
FEDERAL MILITARY TRAINING CAMPS

Poster Used in Many Places, Before the Guards were Called Out, Urging Youths to Enter Training Camps

PHOTO: COPYRIGHT, UNDERWOOD & UNDERWOOD

Part of the Sixty-Ninth Regiment of the New York National Guard Entraining for Camp Whitman, at Beekman, in Response to President Wilson's Call

CONCRETE CLOCK HOUSING ORNAMENTS GOLF LINKS

A concrete standard and case for holding a large clock is an unusual ornamental feature of a Los Angeles golf course. The housing for the clock measures about two feet wide and a foot and a half thick; its walls are 3 in. thick except that the front is of glass and at the back is a door by which access is gained to the timepiece. The simply ornamented standard supporting the housing is about a foot thick at the bottom and tapers to 8 in. at the top. The ornament stands 8 ft. high.

GREAT LINCOLN HIGHWAY STEADILY IMPROVING

It is estimated that some $4,000,000 has been spent on the Lincoln Highway and that to put it in first-class condition from coast to coast will cost $20,000,000 more. That this huge sum will be secured eventually there seems to be little doubt. Meanwhile the number of motorists who are taking trips across the country is increasing enormously. This fact furnishes concrete evidence of the great service which additional improvements on this route would perform. The number of transcontinental trips actually completed in 1912 under the car's own power probably was less than a dozen. The increase since is shown by the fact that last year the number of those who went by motor from the Mississippi to the Pacific is estimated at between 15,000 and 20,000. The highway is now in such condition that a pleasure trip can be made from the Atlantic to the Pacific in less than 30 days; this means driving 10 hours a day at an average of upward of 18 miles per hour. Practically the only trouble now attendant on this journey is unfavorable weather. A large part of the route west of Illinois is still dirt road on which travel is hard after heavy rains, but which in dry weather is in very satisfactory condition. Travelers must not expect always to find such accommodations as obtain quite generally in the eastern states, and yet at no time need one endure hardship. There is no occasion to fear that a transcontinental motor journey would be too severe for women.

Across New Jersey and Pennsylvania the Lincoln Highway is practically 100 per cent macadam, maintained in good condition and well marked. In Ohio there are a few miles of natural dirt road, while in Indiana the route is rapidly being concreted. It is west of Chicago that one finds dirt stretches interspersed with macadam and gravel. In Iowa and Nebraska there is a great deal of natural dirt road which is kept in excellent condition, for the most part, when the weather is good, but which in bad weather is difficult to drive over. In Wyoming, Utah, and Nevada, as well as western Nebraska, the road problem is a financial one because of the sparse population and the great distances covered. In this region the Lincoln Highway Association is working hard for improvements. There is considerable gravel road in Wyoming, because of the abundance of gravel in that state. At Salt Lake City begins the section of the route which many dread most—the desert—but which need possess no terrors for the motorists and instead will prove marvelous and fascinating. Across California the highway is practically 100 per cent boulevard and passes through wonderful scenery. The splendid roads have been constructed largely under state supervision and with state aid.

ILLUMINATING NIAGARA FALLS

By STANLEY W. TODD

Seeing Niagara at Night under the Glare of Electric Lights Was a New Pleasure for Summer Tourists. The American Numerals Inserted Above Indicate the Positions of Lamp Batteries Illuminating the Falls. Inserts Show Type of Lamp Used and How They are Mounted

THOUSANDS of tourists from all parts of the country who have visited Niagara Falls during the season, were treated to an unusual sight, when the falls were illuminated by large incandescent lamps with reflectors. The lights were placed in three different positions, as an experiment, and the trials were so successful that illumination of the falls will probably hereafter be a permanent feature.

There have been other attempts to make a night display of the falls. One of them was made about 10 years ago, batteries of searchlights being played upon the American falls from the Canadian side. The cost of the installation and maintenance of that system limited the display to a few nights.

The most recent experiment was carried on by the officials of the city of Niagara Falls, as a means of furnishing another attraction for visitors. Permission being obtained from the state-reservation officials, the city government coöperated with an electric-lighting company, which makes a particular kind of electric lamp, throwing a brilliant light. A battery of five lamps was placed just below Prospect Point, so that they illuminated the large American falls. A second collection of lights—five in all—was installed on the first bridge to Goat Island. This illuminated the cataracts from that point down to the edge of the falls.

The largest battery was placed on the promontory of Goat Island, which gives an easy view of the Luna Falls and Luna Island. Here 15 lights in two rows gave a powerful glare, and with the others, illuminated all of the falls between Prospect Point and Goat Island.

There were 25 lights in all, each of a thousand watts, and all receiving their power from the falls themselves. The sight was impressive to all the visitors who were present, as well as the officials of Niagara Falls, N. Y., and of Niagara Falls, Ontario. A committee of representative business men of the two cities were behind the plans. The idea was to have the city buy and install hundreds of the reflectors for a complete illumination of all the Niagara falls and cataracts.

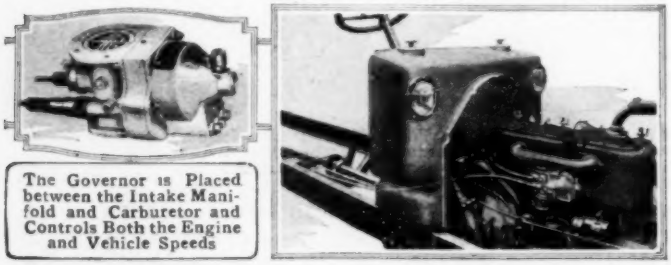
The cost of the lamps was figured at from $30 to $40 each, and the committee decided that from 200 to 300 lights would meet the requirements of

giving just the artistic effect desired, without overillumination. The lamps in the reflectors cost $10 each, and burn 500 hours, carrying them through an entire summer season. For 500 lights it was calculated that 750 horsepower of alternating current would be required.

The total expense of installation of the lights was estimated at about $40,000. The common council last year appropriated $25,000 as a contribution toward the purchase of the reflectors used in the Panama-Pacific Exposition, but the exposition officials wanted $75,000 and in the interim sold them to the Russian government. The money appropriated then will be used in the new lighting scheme.

GOVERNOR PROTECTS TRUCK WITHOUT CUTTING POWER

An American-made governor extensively employed on French military tractors, has demonstrated how the general efficiency of a motor truck may be increased, its life lengthened, and the operating cost lowered. Unlike the usual instrument, this one controls the maximum speed of both a car and its engine, preventing a machine from being driven at an injurious rate on high gear and safeguarding against racing the motor on intermediate ones. Separate maximum engine speeds are provided for different gears, giving increased acceleration and all of an engine's power for heavy pulls when low gear is used. The device acts automatically on a throttle valve of the gridiron type, through which the gas passes in reaching the engine, and is attached between the carburetor and intake manifold. Two flexible shafts, one connected with the propulsion shaft, gear set, or jackshaft, to transmit the vehicle speed, and the other extended from the camshaft, timing gears, or magneto shaft, registering the engine speed, drive the governor. These members convey their power to the governor shaft in such a way that the one revolving most rapidly drives the mechanism. When the speed of the governor is such that it exerts sufficient pressure upon a regulating rod to overcome the effect of an opposing spring, the valve closes. This can be regulated by increasing or lessening the tension of the spring. The engine is under the control of the governor at all times and, when idling, actuates it. The proper proportion of fuel to maintain a predetermined speed is fed to the cylinders without effort on the part of the chauffeur. If upgrade or a heavy stretch of road is encountered, the valve is opened automatically and more gas directed to the engine.



The Governor is Placed between the Intake Manifold and Carburetor and Controls Both the Engine and Vehicle Speeds

ARMY TO USE AMERICAN GUN NOW MADE FOR BRITISH

Throughout the European war an automatic rifle, invented a few years ago by Lieut.-Col. I. N. Lewis of the coast artillery corps, has been employed with remarkable success by the British and Belgian land and aerial forces. Chiefly because of this, it is assumed, the War Department at Washington is once more turning its attention to the instrument and this time will in all probability adopt it for the use of our troops.

The piece is of marked simplicity in construction and embodies certain advantageous points not present in other machine guns. One of its outstanding features is that it can be handled in much the same manner as an ordinary

As is Shown Here, the Rifle Is Easily Portable and is Carried Assembled. The Magazines are Loaded on the Pack Horse at the Right

This Gives a Graphic Idea of the General Appearance of the Piece. It may be Fired from the Shoulder Like an Ordinary Rifle

Some 440 Shots a Minute can be Fired from This Machine Gun, Invented by an American and Extensively Used by the British and Belgian Land and Aerial Forces in Present War

Shooting from a Vantage Point in a Tree, a Picture Which Shows How Readily the Weapon may be Adapted to the Needs of the Moment. It has been Used Effectively against Air Craft, Both When Mounted and Unmounted

field rifle, and when used in this capacity is supplied with a buttstock instead of the spade handle that is employed when the weapon is mounted. It weighs approximately 25 lb. and can fire 440 shots a minute—this including the time spent in changing magazines. There are only 62 parts, and the design is such that the point of a bullet unlocks each portion of the mechanism, entirely obviating the need of special dismantling tools. It is air-cooled, and so effectively that auxiliary barrels are not required even for long-continued firing.

Fitting around the barrel is a longitudinally ribbed aluminum jacket inclosed by a steel casing which projects, at a reduced diameter, beyond the muzzle. The ribs radiate the heat, while cool air is drawn through the tubing by the exhaust effect of the explosion. Also there is practically no kick when firing. Responsible for this is the fact that the gases are so directed that the friction between them and the outer casing tends to carry the gun forward when it is discharged, thus counterbalancing the opposite force of the recoil. The magazine is distinctive, being cylindrical in form and mounted on top of the barrel at the rear. It holds 50 rounds of rifle ammunition. In operation the instrument is similar to that of most automatic guns, empty cases being ejected, fresh cartridges inserted in the firing chamber, and the gun cocked by gas pressure. Obviously the rifle spits bullets so long as the trigger is pressed back. Since it is light, practically without recoil, and in no danger of overheating, it has proved to be exceptionally effective on Europe's battle lines.

MECHANICAL DISPLAY FOR RUBBER HEELS

Graphic illustration of the shock-absorbing qualities of a rubber-heeled shoe is given by a window-display

This Demonstrating Machine Presents the Argument of the Rubber-Heeled Shoe by Contrasting Its Shock-Absorbing Qualities with Those of an All-Leather One

apparatus that is now being used in a number of cities. The device is so arranged that two shoes, one having an ordinary leather heel and the other a rubber one, are alternately struck with equal force against separate bricks resting on a scale. The force of the blows are indicated on a dial supported above a cabinet in which the weighing and operating mechanisms are housed. Only the heels of the two shoes come in contact with the bricks. The impact of the leather member registers 70 lb. on the dial, while that of the rubber one amounts to approximately 10 lb. These figures are not intended to be representative of the force of an average man's step, but they do show the accurate ratio between the shocks transmitted to the body through leather and rubber heels.

EXTENSIVE GUN REPAIRING NOW DONE AT THE FRONT

One of the interesting changes which has come at the front in France and elsewhere as a result of the armies "digging themselves in" has been the transformation of the gun-repair shops from simply equipped, portable affairs to elaborate establishments where all but very difficult repair work can be done and where rows of weapons, polished and as good as new, can be found lining the walls of some of the buildings. One French depot, designed originally for doing casual repair work on 75-centimeter guns, is described as now occupying a whole group of farm buildings a short distance back of the lines. The ingenious officer in charge has appropriated every form of machinery from the near-by village that could possibly serve his workmen. Among the coveted pieces of property was a threshing machine discovered in a shed that was within the range of the German guns and had been shattered by them; as it happened the machine had been unharmed. A cleverly planned night expedition rescued the prize, though the clatter which it made on the road brought a rain of shells from the enemy. During recent hard fighting this depot was able to repair two and three guns a day, sending them back within 24 hours. One shed is occupied largely by repaired rifles, automatic pistols, revolvers, and bayonets, which have been gathered on the field. A small reward is offered for all weapons brought in from between the lines.

POLICE MOTORCYCLE CAN CARRY FIVE PERSONS

The speed and economy of a motorcycle and a carrying capacity practically equal to that of a five-passenger car have been combined in an exceedingly useful vehicle which was recently designed and built under the direction of two Philadelphia police officers. To a motorcycle has been added a heavily built sidecar having a seat, with a back

Philadelphia's Patrol Motorcycle Serving as an Emergency Ambulance
Car Also Carries Fire Extinguishers and First-Aid Equipment

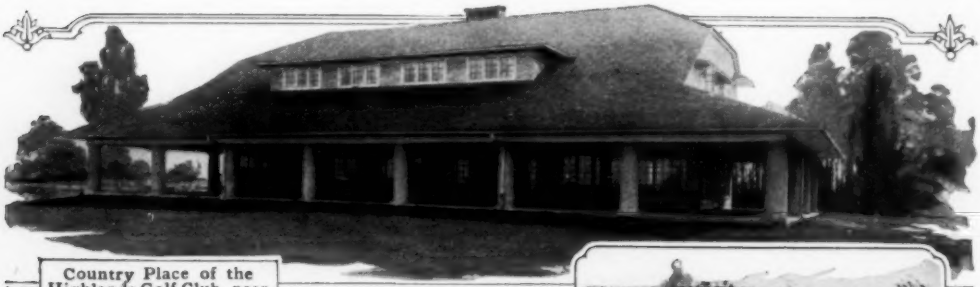
that will accommodate two persons; this gives the car seats for four, counting the one behind the driver. The equipment includes a pulmotor, two chemical fire extinguishers that are fastened to the rear of the sidecar, a first-aid outfit, a stretcher, and a rubber pillow. In an emergency a person on a stretcher can be carried on the platform which extends under the side seat; a prisoner can be carried in a similar way. This vehicle can be operated and maintained much cheaper than regular patrol wagons, either horse-drawn or motor. It is capable of a speed of 60 miles per hour. The quickness with which it can be gotten under way and the ease with which it can be driven through a throng make it especially suited for work in such an emergency as a fire, riot, or the like.

FLEXIBLE PIPE ON WHEELS IS STREET WASHER

A town of some 10,000 inhabitants in Oregon, Baker City, undoubtedly has the queerest street-flushing equipment used in America. It consists of a flexible pipe line mounted on wheels and constructed by coupling 6-ft. sections of 3-in. tubing with short lengths of fire hose. A horse is hitched at one end where a long piece of pipe, tipped with a section of hose, is used as a nozzle. This elongated, hyphenated contrivance is drawn from fire plug to fire plug and from one street to another as the pavements are washed. The town receives its water from a reservoir situated about 2,000 ft. above it on the summit of a mountain. Thus the pressure is adequate for the purpose.

An Oregon Town Uses This Multiwheel, Segmented Pipe Line as a Street Flusher

AMERICA'S ATTRACTIVE COUNTRY CLUBHOUSES



Country Place of the Highlands Golf Club, near Grand Rapids, Michigan, a Building of Artistic Outdoor Architecture in Harmony with Beautiful Surroundings

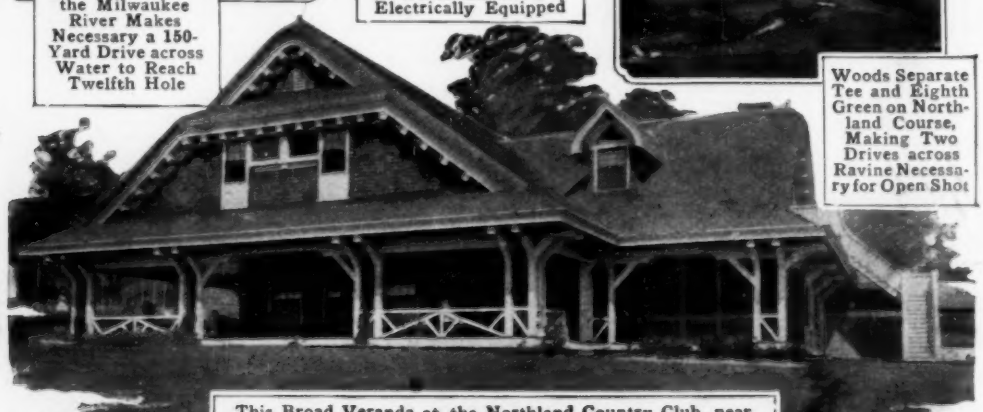
Eighth Hole, 164 Yards: Green on Mound with Pits on Two Sides and Rear and Bunker Ahead. Bogey Is Four; has been Made in Two

Quiet, Informal Quarters of the Blue Mound Country Club, near Milwaukee. Its 18-Hole Course is Said to Be One of the Most Hazardous in the Middle West

A Broad Bend in the Milwaukee River Makes Necessary a 150-Yard Drive across Water to Reach Twelfth Hole

Inviting Seat of the Milwaukee Country Club, an Airy Concrete and Stucco Building Finished Throughout in White Enamel and Electrically Equipped

Woods Separate Tee and Eighth Green on Northland Course, Making Two Drives across Ravine Necessary for Open Shot



This Broad Veranda at the Northland Country Club, near Duluth, Is the Frequent Scene of Gay Affairs during the Summer. The Golf Links are Cut by Ravines and Dotted with Wooded Patches. Most of the Hazards Are Natural

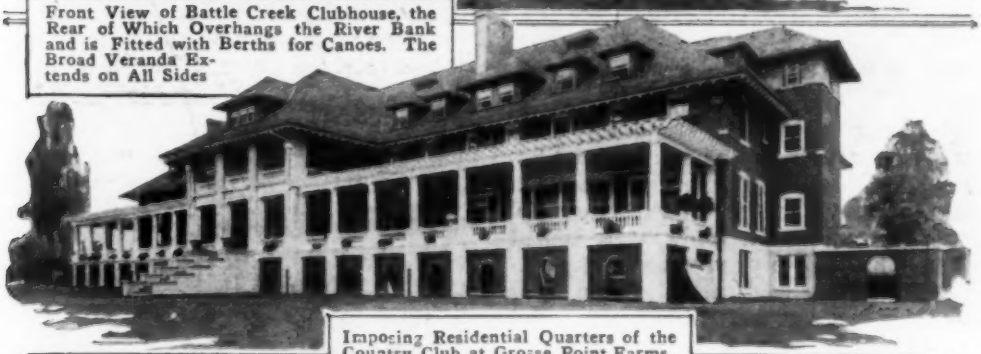
AND SOME OF ITS BEST-KNOWN GOLF COURSES

Comfortable Home of the Kent Country Club at Grand Rapids, Situated on the Crest of a Hill Overlooking One of Michigan's Popular Golf Courses

The One-Shot Fifth Hole on the Kent Course. The Tee Is at the Crest of a Slope above Water and the Putting Green on the Summit of a Steep Hill

Both Golf and Water Sports are Enjoyed at the Battle Creek Country Club, Situated on a Bank of the Kalamazoo River

Front View of Battle Creek Clubhouse, the Rear of Which Overhangs the River Bank and is Fitted with Berths for Canoes. The Broad Veranda Extends on All Sides



Imposing Residential Quarters of the Country Club at Grosse Point Farms, the Exclusive Rendezvous of Detroit's Wealthy Golfers

The "Nineteenth Hole" on the Grosse Point Course: The Comfortable Pavilion and Well-Fitted Locker House a Mile or So from the Club

Nearing the Twelfth Hole, One of the Interesting Stretches on the Detroit Links. Rough Ground and Sand Pits Making Niblick Shots Frequent

THIRTY-TON LIGHTHOUSE MOVED ON A SCOW

Engineers in the employ of the government recently performed the unusual feat of transporting a 30-ton lighthouse which had stood for some years on a pier in the harbor of Sheboygan, Wis., to the outer end of a new breakwater there. A scow, 120 ft. long and 35 ft. wide, was lashed alongside the old pier and the big cylindrical tower was jacked up on long beams, 12 in. square. A sort of trestlework, resting both on the scow and the pier, was employed to support the ways which served as a continuous track for moving the structure; the support was so built that the weight of the lighthouse, as it moved out onto the scow, was evenly distributed over the latter, thereby avoiding any tipping. Lines were fastened like stays from the air ports in the tower to the sides of the barge to steady the structure. After a tug had pushed the singular load to the new breakwater, the barge was firmly moored and the tower pulled along timber-supported ways to its new concrete foundation. The entire transfer occupied three days, one day being consumed in actual moving. Had the transfer not been made, the government would have been put to the considerably greater expense of erecting a new lighthouse.

Moving a Sheboygan Lighthouse Weighing 30 Tons on a Scow to a New Breakwater

SURF BATHERS RIDE WAVES ON INFLATED "SHARKS"

At different coast resorts in southern California some of the bathers are riding the breakers on pneumatic canvas "fish" which have lately been introduced. This sport takes the place of surf boarding, which requires skill that can only be acquired through considerable practice. Those who are not adepts with the latter device can ride the inflated "sharks" with ease at the outset—a decided advantage to tourists especially. Furthermore there are few beaches in California where the breakers rush in with the swift, long sweep needed for real surf boarding. This is one of the reasons why the sport so highly developed at Honolulu has not the same popularity on this side of the Pacific as it has there. The "fish" now coming into vogue is six or seven feet long and provided with large balancing fins about a yard in length.

California's Substitute for the Surf Board: A Large Pneumatic "Fish" on Which Bathers Ride the Breakers

CONCRETE HIGHWAY TRESTLE OF RECORD LENGTH

One of the most absorbing examples of concrete construction so far executed in America is represented by a causeway that spans the Yolo bypass in the Sacramento Valley. It is thought to be the longest trestle of its kind in the world and has lately been completed under the supervision of the California State Highway Commission. Although 3.09 miles from end to end, and a striking specimen of good, accurate workmanship, this elevated roadway was built in a thoroughly substantial manner for less than $395,000. Certain phases of the construction were accomplished by original methods which have attracted the attention of engineers.

The unit system was followed in erecting the trestle, which is 20 ft. in height and provides a roadway 21 ft. wide. It is supported on reinforced-concrete piles, each weighing from three to five tons, that were driven into place. The floor consists of precast slabs. Four of these were placed side by side to span the 20-ft. gaps between the bents, the full width of the structure. The parts were so carefully designed and put together that the completed trestle is a monolithic structure.

Yolo bypass is a channel that has been permanently reserved by the state to care for the flood waters of the Sacramento River. In the summer time it becomes half prairie and half swamp, but during the rainy season of the year it is a veritable lake of considerable depth. This is the reason for the great height of the trestle, which, at one point, is provided with a bascule bridge that dredges may pass, during the season of high water, to repair the levees.

When work was commenced on the structure the bypass was essentially dry. A large pile driver was placed on skids and the supporting columns pounded into place in the same manner as if they had been timber members. Four of these were used to form each bent, the inner pair being vertical, and the outer ones set at slight angles. Piles of five different lengths, ranging from 32 to 50 ft., were cast so that they might be driven to the desired grade and obtain the necessary resistance. A driver having a 5,000-lb. ram with a 3½-ft. drop, striking 56 blows a minute, was used. It is interesting that no trouble was encountered

Putting One of the Floor Slabs in Place: These Members Weigh Several Tons and Span the 20-Foot Gaps between the Bents

California's Great Concrete Trestle, Undoubtedly the Longest Ever Built, Is an Interesting Example of Engineering

These Large Precast Concrete Piles were Driven into Place with Remarkable Accuracy, Their Alinement Being Almost Perfect

in doing this and that none of the piles was shattered. Nearly all were driven to the precise depth desired, making it necessary to saw off the heads of but an exceedingly small number.

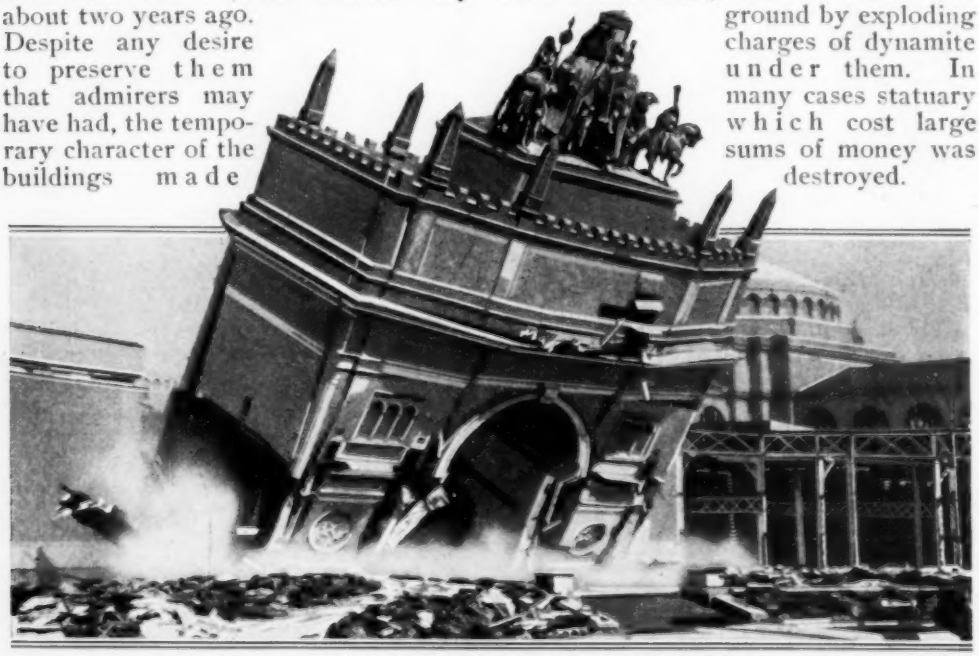
Before this work could be completed the swamp became flooded. This necessitated that a different procedure be followed, and the condition was met by erecting a temporary wood trestle ahead of the concrete one to carry the pile driver. One end of this was torn up and the other extended, as the work progressed.

Just as quickly as a bent was placed, a temporary cap was put across two piles on one side and connected with stringers. Ties were spaced across these and rails laid connecting the track used by the supply train. In this manner all of the piles were brought forward as rapidly as they were needed by the driver.

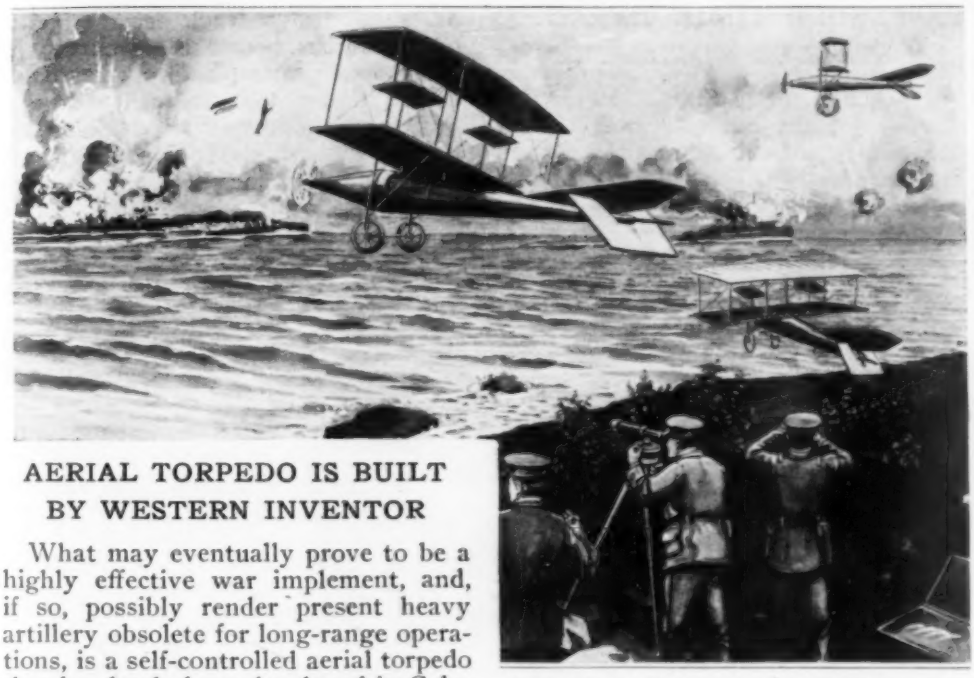
The caps for the bents were poured. Forms were built around the heads of the unobstructed double line of piles at the side of the track. This work was done at night, for the railway was used throughout the daytime to deliver material ahead. After the caps had seasoned for a month, the precast floor slabs were put in place on them with the aid of a traveling gantry crane. The completion of this half of the flooring allowed the track and temporary work on the opposite line of piles to be removed and a similar procedure followed. The floor thus provided was surfaced with asphalt after the parapets had been erected.

EXPOSITION STRUCTURES ARE DYNAMITED

An event which was not without its regrettable aspects was the recent wrecking of the beautiful buildings and monuments of the exposition at San Francisco which were erected only about two years ago. Despite any desire to preserve them that admirers may have had, the temporary character of the buildings made their demolition advisable. Many of the fine monumental structures, such as the "Arch of the Rising Sun," surmounted by a group entitled "The Nations of the East," were thrown to the ground by exploding charges of dynamite under them. In many cases statuary which cost large sums of money was destroyed.



The Artistic "Arch of the Rising Sun" at the San Francisco Fair, Photographed Just as It was Crashing to the Ground



Defending Our Coast with Aerial Torpedoes: The Artist's Conception of the New Weapon in Use

AERIAL TORPEDO IS BUILT BY WESTERN INVENTOR

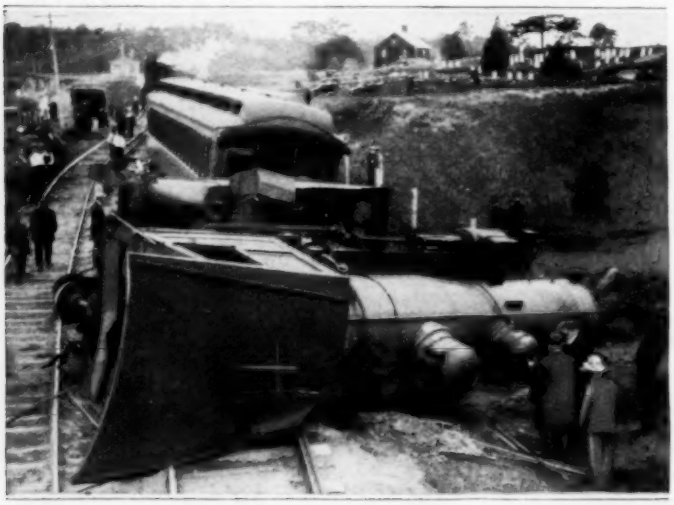
What may eventually prove to be a highly effective war implement, and, if so, possibly render present heavy artillery obsolete for long-range operations, is a self-controlled aerial torpedo that has lately been developed in Colorado. The complete details of its construction are not available because legal action has interfered with the patent proceedings, and for this reason it is impossible to form definite conclusions regarding its worth. In a general way, however, the instrument attempts to accomplish over land what the United States Navy's new wireless torpedo does at sea. Its principle and method of operation, of course, are entirely different. As is to be inferred, it consists of a small air craft—much like an ordinary biplane—carrying a large, high-explosive torpedo which it is designed to drop at any predetermined spot within a certain radius. The projectile, which is about 12 ft. in length, forms the body of the machine and is divided into two compartments. The propeller is mounted at the front end of it, while the shaft extends through the entire torpedo to the rear compartment where an 18-hp. motor is housed. The speed and course of the machine are regulated by means of a gyroscopic mechanism, while a timing device of some sort releases the engine-containing missile at the proper instant for it to strike its target. A working model of the apparatus, which it is estimated will cost about $4,000 each to manufacture, has been used in tests conducted near Denver and has attracted considerable interest locally.

BIG MOTORSHIPS SEEK GULF FREIGHT TRADE

Gasoline-driven schooners are now bidding for ocean freight trade as a result of the scarcity of steam tonnage due to war conditions. A company has been organized in New Orleans to establish a freight service of large vessels of this type and has already secured two four-masted schooners and equipped them with 100-hp. gasoline motors. The firm expects to send these, and other vessels on which options have been secured, to Mexico, Central America, and the West Indies, and it is believed the boats will be able materially to relieve the freight congestion that exists in many of the ports in those countries.

PASSENGER TRAIN DERAILED BY STALLED MOTOR TRUCK

It is not often that a motor car wrecks a train, but such was the result of a recent collision on the Boston & Maine Railroad at West Peabody, Mass. A heavy truck became stalled on the tracks near a blind curve presumably a moment before a passenger train rumbled down upon it, cutting it in two and killing its driver. One section of the vehicle buckled under the pilot of the locomotive and was bumped along the track for approximately 100 feet. It then became wedged beneath the engine, causing the latter and its tender to double up, plunge from the rails, and drag three coaches with them. Practically nothing remained of the motor truck except splintered wood and smashed and twisted metal parts. The locomotive was badly damaged and some of the passengers slightly injured. Traffic was delayed for several hours.



The Result of a Collision between a Passenger Train and a Motor Truck

MECHANICAL FAN APPLIANCE FOR ROCKING CHAIR

Another mechanical rocking-chair fan of the revolving type has been contrived. This latest device, for which patent rights have not as yet been issued, is almost noiseless when in operation. The details of its construction are withheld for obvious reasons, but the general arrangement is apparent. A small fan, protected with a guard, is mounted on one arm of a chair and connected by a flexible cable with the actuating mechanism. The latter is housed in a triangular case from which casters project in front and rear. It is clamped to the outside of one of the rockers and can readily be attached or removed as occasion demands. The fan revolves steadily in one direction at sufficient speed to throw a cooling current of air against the occupant of the chair.

As the Chair is Rocked the Fan Throws a Cool Draft of Air upon the Occupant

¶Russian shells are given a high polish, it is said, to prevent their collecting lint from the gloves of the munition handlers; the lint would fill up the clearance between the shells and the bore, impairing the gun's accuracy.

RANDOM PHASES OF WAR FROM BRITISH VIEW

Germans Taken by the Northumberland and Royal Fusiliers during Battle of St. Eloi: The Prisoners Seem in Good Spirits and Glad Their Fighting Days Are Over

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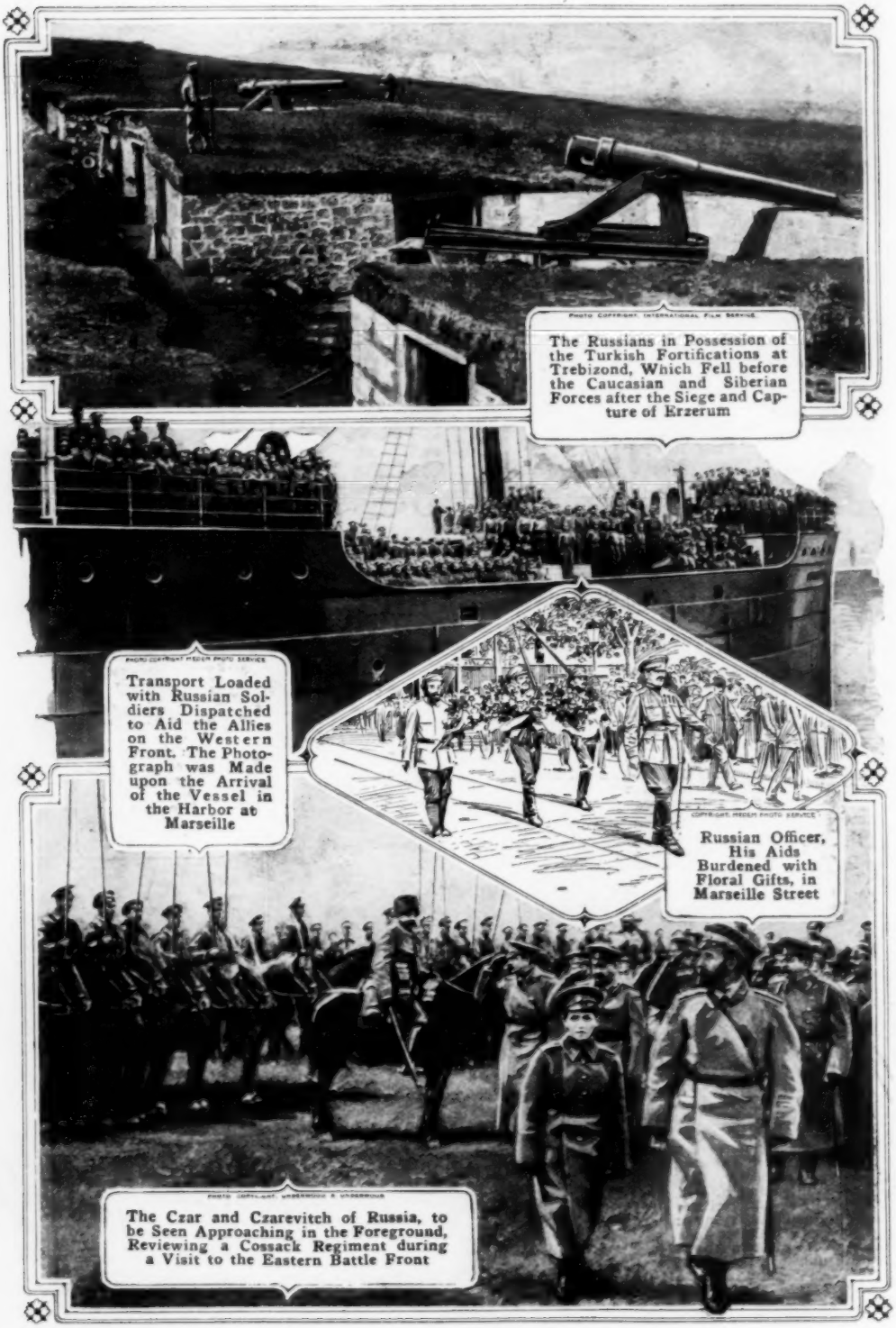
Novel Twin Motorcycle and Sidecar Used at Front by Titled English Family Engaged in Ambulance Work: They Recently Visited London after 19 Months on the Firing Line

Packing Equipment on Camel Used by the British Red Cross on the Frontier in Egypt

After the Battle of St. Eloi, in Which the Germans were Defeated, Showing Members of the "Fighting Fifth," Northumberland Fusiliers, Trying on the Helmets and Respirators Abandoned by the Enemy

WITH RUSSIA'S FORCES IN FRANCE AND TURKEY



The Russians in Possession of the Turkish Fortifications at Trebizond, Which Fell before the Caucasian and Siberian Forces after the Siege and Capture of Erzerum

Transport Loaded with Russian Soldiers Dispatched to Aid the Allies on the Western Front. The Photograph was Made upon the Arrival of the Vessel in the Harbor at Marseille

Russian Officer, His Aids Burdened with Floral Gifts, in Marseille Street

The Czar and Czarevitch of Russia, to be Seen Approaching in the Foreground, Reviewing a Cossack Regiment during a Visit to the Eastern Battle Front

PICTORIAL SIDELIGHTS ON FRANCE IN WARTIME

Bathhouse Squad Which Rushes Slothful, Grimy Soldiers and Sees That They are Thoroughly Scoured Despite Their Aversion for Water

Mobile Dental Shop for Benefit of Soldiers: The Car is Completely Equipped with Modern Dentistry Appliances

PHOTO COPYRIGHT, MEDEM PHOTO SERVICE

French Infantry Regiment Bound for Saloniki: The Soldiers are Boarding a Battleship at "Some Port in France," Probably Marseille or Some Other Mediterranean Town

Horse Meat has Failed to be Received with Enthusiasm at New York, Where Its Sale is Now Permitted. The Contrary Is Apparently the Case at Paris, Where This Picture, Showing a Crowd before Such a Market, was Taken

IN THE FIRST-LINE TRENCHES AND AT REAR

PHOTO COPYRIGHT MEDEM PHOTO SERVICE

Picturesque Glimpse behind the Battle Lines Showing Cavalry and Artillery Detachment Watering Army Horses in a Swollen Stream

PHOTO COPYRIGHT MEDEM PHOTO SERVICE

French Soldiers Removing a Trench Gun from Its Place of Concealment in the Vicinity of the Corbeaux Woods

Regimental Colors of Entire French Army Assembled to Salute a Division That Distinguished Itself in the Severe Fighting at Verdun

PHOTO COPYRIGHT MEDEM PHOTO SERVICE

Entrance of a Small Subterranean Chapel near the Trenches Where Mortally Wounded Soldiers are Carried When the Last Sacrament Is to be Administered

WITH THE FRENCH DEFENDERS BEFORE VERDUN

Two Frenchmen, Their Helmets Visible in the Foreground, Watching a German Shell Bursting 100 Yards or More in Advance of the First-Line Trench

Mouth of an Underground Shelter Where Defenders Manning Fort Douaumont Take Refuge When Shells Rain Heavily from Massed Batteries of Artillery

Entrance of Fort Douaumont, One of the Outer Fortifications at Verdun Which has been Captured and Recaptured Several Times

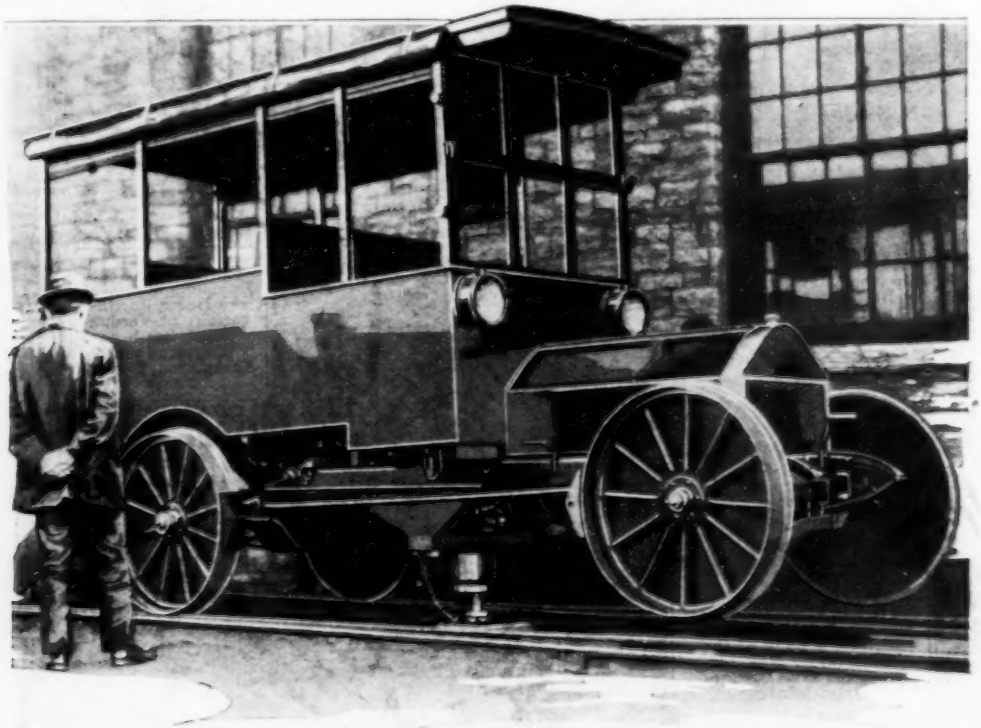
Shallow, Snow-Filled Trench Abandoned by the Russians in a Churchyard on a Bank of the Duna River Not Far from the Old Town of Friedrichstadt

SIGN LIGHT AND MAIL BOX COMBINED IN GATEPOST

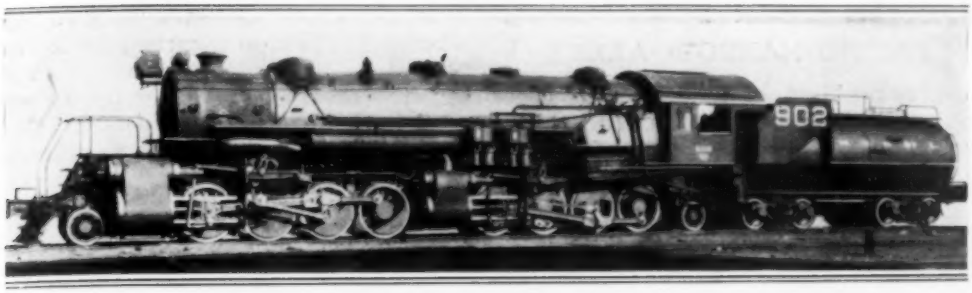
A California physician in building a fence about his property so constructed one of the gateposts that it serves three functions. It is surmounted with a glass globe in which is an electric bulb that lights the roadway at night. The globe also serves as a sign, for it bears the doctor's name, the letters being visible both day and night. While the concrete for the post was being poured, an ordinary mail box was inserted in the front side of the form. The owner now has an inconspicuous mail box, well sheltered and well secured.

AUTOMOBILE CHANGED INTO RAILWAY-INSPECTION CAR

A car for use on a railroad track by the general manager of a western line, has been constructed by remodeling an eight-cylinder touring automobile and equipping it with wheels having a steel lining and railway-wheel flanges. Eight seats face the rear and two face the front. The steering wheel has been removed, but otherwise the car is operated like an ordinary automobile. By means of an air jack fastened under the car the latter can be raised off the track and turned about by one man. Practically the entire body of the car, as it is at present, is of steel. It is claimed that the rail vehicle has made 80 miles an hour on a straight stretch of track and that it would be capable of a speed much in excess of that except for the fact that it is not heavy enough to stay on the rails when running so fast. The car is equipped with a windshield and side curtains.



Remodeled Eight-Cylinder Touring Automobile, Fitted with Flanged Wheels and Seats for 10 Persons, Which Is Capable of Great Speed on a Railroad Track



One of the Big Articulated Compounds being Used in Tennessee to Draw Heavy Freight Trains over Mountain between Nashville and Chattanooga

BIG ENGINES DRAW TRAINS OVER SOUTHERN MOUNTAIN

Three locomotives which are said to be the largest ever used in the South were recently delivered to the Nashville, Chattanooga & St. Louis Railroad to pull heavy freight trains over Cumberland Mountain between Nashville and Chattanooga. The engines are the same in class and size, each being an articulated compound of the superheater type and weighing, with the tender, approximately 635,000 lb. They have nearly three times the tractive power of the biggest locomotives previously used on the system. It is not intended to put them in service on regular runs, but to use them chiefly at the mountain. They burn soft coal and have carrying capacity for 14 tons. In each case the wheel base of the engine and its tender is slightly less than 86 ft. The locomotives were taken to Atlanta, and in order to reach Chattanooga from there they had to be detoured by way of Birmingham so as to avoid a tunnel which they were too broad to enter.

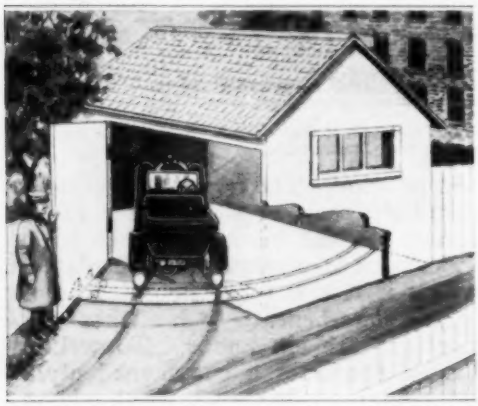
DEVICE AIDS THE BLIND IN WRITING

Writing in Braille characters—the system of raised dots commonly used by the blind—is greatly simplified by employing a slate now on the market. Heretofore it was necessary to face the characters backward and to arrange them from right to left so that when the sheet was turned over the raised letters appeared in the proper order and position. The new device consists of a light rack, or slate, which can be carried in the pocket. Paper to be written on is inserted under a plate in which is a row of rectangular holes; on the slate beneath each of these perforations are six knobs. To write a Braille character a cup-shaped stylus is pressed against such of the knobs as will form the desired letter, thereby embossing the selected dots, rather than making indentations. To begin a new line or to allow the writer to feel of his work, the paper may be moved along by means of a rubber roller with square ends which serves to space the lines accurately. In solving arithmetical problems the blind have commonly used movable type, which is unsatisfactory because it cannot be permanently preserved as set up. This slate enables one to record permanently any number of figures and then add, subtract, or divide as he desires.

A Slate with Which One can Write with Braille Characters without being Required to Invert Them and Reverse Their Order

SPECIAL DOOR FOR GARAGE FACING NARROW ALLEY

The problem of building a garage that is accessible to one driving a motor even though it opens on an alley



This Side Door, to Which a Low Platform Supported by Wheels is Attached, Makes a Garage Facing on a Narrow Alley Easily Accessible

so narrow that a car cannot back out of the structure, has been solved by designing a door at the side instead of the end of the garage. The hinged edge of the door is farthest from the alley. Projecting from, and fastened to, the inner side of the door near its free edge is a platform that lies close to the ground and is supported by wheels that run on a curved track imbedded in the ground. To put up a car, it is driven through the open door until its hind wheels rest on the platform. The door is then swung around, carrying the rear of the car with it. By reversing the procedure the car can be backed into the alley easily. The cost of constructing this door is not great.

PARK BUILDINGS ON STILTS BECAUSE OF FLOODS

Six-foot concrete piers have been placed beneath all of the main park buildings on Harriet Island at St. Paul. The grounds form a recreation place for those in the congested section of the city, and during the summer months are frequented by thousands of persons. Harriet Island, however, is situated in the middle of the Mississippi River and is one of the lowest points in St. Paul. During the spring of the year the river is always swollen and the park frequently inundated. The buildings, including the bathhouses and animal cages, have been placed on stilts not merely to protect them from damage, but also for sanitary reasons.

Pavilion on Harriet Island Supported on Concrete Piers to Protect It from Injury during the Periodical Inundation of the Park

DIRECTING CHICAGO'S PREPAREDNESS PARADE

MORE than 130,000 men, women, and children marched through the business district of Chicago June 3, in the interests of national military preparedness. The parade, which had been conceived only three weeks previously, was undoubtedly the greatest civilian demonstration of its kind ever witnessed in America. The story of how this great throng of people poured past the reviewing stands to the time of scores of bands has reached every village in the country. But there is another story of equal interest and great significance which is not so well known. It is that of a soldier who, without seeing a single marcher, directed the entire parade, anticipating the hitches, meeting them, and causing the great column to move smoothly from early morning until night. Capt. Raymond Sheldon, U. S. A., sat for ten hours at a telephone before three maps, hung on the walls of a down-town office, and moved his "troops" with clocklike precision. To him it was a mere problem in mathematics with some of the elements of a chess game thrown in.

On the evening before the event, tabulations showed that 210,000 persons intended to march. These were separated into 12 divisions, each headed by a marshal, and subdivided into sections. These latter units, led by assistant marshals, were composed of volunteers from different business, social, and institutional organizations. Thus were insurance men, telephone workers, jewelers, Spanish War veterans, and others grouped. The place and time of assemblage of each of these subdivisions and the time they would march were determined in advance, and the final schedule announced in the newspapers.

The maps at headquarters showed the heart of Chicago, with the line of march indicated in red. Each was identical to the other and drawn to the scale of one inch to 1,000 ft. By assembling the marchers in rows three feet apart, 3,000 men could be gathered in 1,000 ft. of road space. They were to walk 16 abreast, and if approximately 200,000 were to parade in the prescribed period it was necessary that 20,000 pass a given point each hour. This meant that the rows must be kept about five feet apart and moved 88 ft. a minute. On the maps each division was represented by a strip of colored cardboard, one inch standing for 1,000 men, pinned in place at the points of mobilization.

Chicago's Preparedness Parade: Showing Thousands of Marchers Passing North in Michigan Avenue. The Arrow Points to the Home of Popular Mechanics Magazine, While in the Foreground, at the Right, Is the Public Library Building and at the Left, Grant Park

The problem of handling the parade is not apparent unless one realizes the physical character of down-town Chicago. The business center is congested, and the line of march instead of being straight, was woven in and out through the "loop" district, first extending north in Michigan Avenue. To congregate thousands of marchers an hour before the time they were expected to enter the column, and group them at points readily accessible to the starting place, without blocking the

procession, was difficult. It was done by allowing some of the first units to extend across end points on the line of march while assembling, and then by moving them before the head of the parade could reach these locations.

For the first two hours the column advanced according to the predetermined plans. It then became apparent that the number of marchers would be materially less than 210,000. The problem thus became one of making the expected showing with a smaller army than had been counted upon. As a matter of fact, 130,214 persons participated in the demonstration.

At 18 different places along the route and at points of mobilization, telephone stations were provided. These were in direct communication, through a switchboard, with Captain Sheldon's office, where four wires were in operation. Three stations, one situated at Michigan Avenue and Van Buren Street, the starting point of the parade, and two at general assemblage points, were order posts where five aids, each a national guardsman, were detailed. At four other points, spaced at vital points along the line of march, were similar stations each manned by one aid. All of the others were observation posts. These were indicated by numbers on the maps.

The purpose of using three charts was to avoid confusion. One was employed during the morning, another in the early afternoon, and the third at night. As quickly as a division assembled the fact was communicated to headquarters when an inch, two inches, or even a foot of pink, red, green, or some other color of cardboard was pinned to the proper place on one of the maps. In this way the exact location and size of each division was plainly visible. Messages from along the line announced the progress of the procession. Sometimes this was too fast, and at other times too slow. When these conditions presented themselves, directions were sent out to the order stations to slow down the marchers, or speed them up, as the case might demand.

To the captain the line of march was a tunnel. When a division entered it, a piece of cardboard was taken from one of the maps and dropped to the floor. So far as he was concerned, it was out of the way. Its rate of march and the distance between its ranks were the only remaining things that interested him. Each unit was supposed to have about 20,000 members. Some of them had as few as 1,000. When such conditions arose they had to be met quickly, and orders were shot to different stations by telephone. As an example of how trying some of these developments proved, a half hour before the eighth division was to enter the parade, aids reported that instead of having 25,000 men, it would muster but 4,000. A few minutes later it was announced that the ninth division would be 1,000 strong, instead of 16,000. Here was a loss of 36,000 men with a half-hour's notice. There was no confusion, however, and the parade moved along without an apparent hitch. Every one of the divisions began marching on the scheduled time previously announced in the newspapers.

In addition to attending to these details, the officer assumed the responsibility of city manager. As rapidly as streets were vacated for a block or more, he opened street-car lines so as to assist in dispersing the crowds. Hotels and clubs were likewise informed when routes were opened to the depots for their taxicabs and baggage trucks.

The parade was like the mobilization of a great army. All traffic in the business part of Chicago was suspended, even motor cars being refused the streets in order that the big mass of "troops" might be assembled orderly and moved with smoothness to its destination.

¶ It is estimated that there are 200,000,000 tons of potash contained in lava in the Leucite Hills of Wyoming. Chemists are now seeking ways to extract it and make it available for commercial purposes.

COMPACT OUTING TRAILER HAS SPECIAL FEATURES

This Trailer Carries Accommodations for Four; It can be Set Up in Five Minutes, Weighs 550 Pounds, and Has a Capacity of 1,500 Pounds

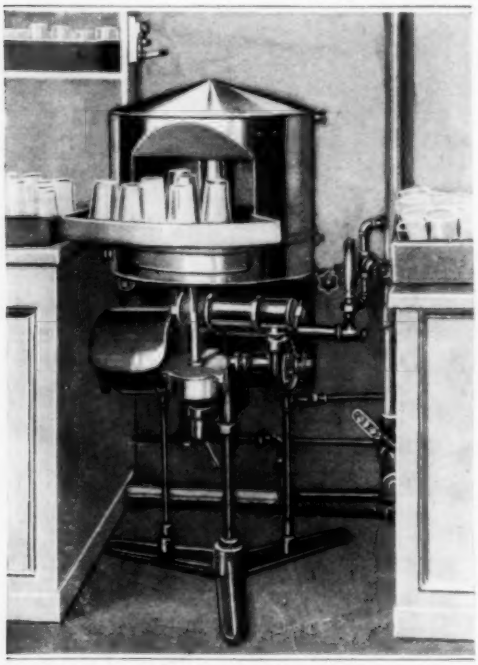
End View of the Tent, Showing Folding Camp Table and the Shelves Suspended from the Tent Roof; These Articles and Also an Ice Chest Come with the Outfit

The Cover of the Trailer Serves as the Central Portion of the Tent Roof; the Beds can be Quickly Drawn into Position Either Side of the Trailer Body

A strong, light trailer in which two double beds are neatly packed together with a khaki covering and extensive camp equipment, is now being manufactured for those who desire a portable outing outfit for a party of two, three, or four persons. The trailer has two artillery wheels with solid-rubber tires; its box measures 6 ft. 9 in. long, 3 ft. 8 in. wide, and 11½ in. high. Into it the two mattresses supported by strong springs fit snugly. To set up the trailer tent it is only necessary to place four supports under the canopy, which is the same size as the box and serves as a cover for it when the outfit is packed; the lower ends of the poles are inserted in sockets provided on the corners of the trailer. The beds can be lifted up in turn and drawn to the right and left sides, respectively, after which tent poles, that have special supporting means on their sides, are set in place to hold up the outer corners of the beds. These poles also hold up the tent walls which unroll from the edges of the canopy and are drawn down over the beds; the poles are tall enough to allow sufficient clearance above the mattresses. One end of the trailer box is hinged and can be dropped down, making it easier to enter the tent. On the floor of the box there is room to place a small table, cooking stove, and other articles. The beds can be used as benches. An ice chest, a stove, folding table, and three shelves with suspension chains, by which they can be hung at the end of the tent, all come with the outfit. The ice chest is carried under the trailer. The outfit weighs 550 lb.; it can be easily adapted to commercial use.

GLASS-WASHING APPARATUS HAS LARGE CAPACITY

For hotels, restaurants, and soda fountains, a motor-driven machine for washing glasses and goblets has



The Machine Washes and Sterilizes About 1,000 Drinking Glasses in an Hour's Time

been introduced which does its work quickly and with thoroughness. Glasses are placed on a rotary tray inside of a tight compartment and subjected to sprays of water which strike them from all directions. Before being removed they are rinsed with hot, clear water, so that they dry quickly, without being wiped, when taken from the machine. The apparatus is said to be capable of handling about 1,800 glasses an hour, and, when electric current is available at the average rate, can be operated that long for an estimated cost of eight cents. It uses a considerable amount of hot water, and when employed where this is not regularly supplied, an automatic gas heater is attached. Pieces of china not greater than eight inches in diameter can likewise be washed.

DUTCH GUIANA EXPECTS BIG YIELD OF BAUXITE ORE

The recent discovery of what is said to be very extensive deposits of bauxite in Dutch Guiana, South America, may have a depressing effect on the prices of aluminum, which are now at a high level. According to first-hand accounts assays of this lode show a return of from 70 to 75 per cent alumina. The discovery of these deposits was purely accidental and came about in a curious way. A foreigner from the United States was visiting in the country and went into a garden to examine some shrubbery; while inspecting the roots he observed some unusual characteristics of the soil. He had some knowledge of minerals and it seemed to him that he had made a valuable discovery. On extending his examination he found that the entire garden was strewn with bauxite. Until this discovery both natives and foreigners had regarded this bauxite as nothing but valueless dirt and had used it in making their garden walks and the like. Dutch Guiana is within easy reach of New York and has a climate that has proven healthy for white men. Many believe that these factors will tend to a rapid development of these bauxite deposits.

DETROIT BUILDS TEMPORARY BRIDGE TO BELLE ISLE

Following the rejection by the voters of Detroit of a proposed bond issue for a $2,000,000 bridge from the mainland to Belle Isle, the city's favorite recreation spot, the Detroit city council has ordered the construction of a $100,000 temporary structure to take the place of the bridge which was burned nearly two years ago. The cheaper bridge is being built alongside the stone piers and steel swinging section, which are all that remain of the burned structure; it will be five-eighths of a mile long. To be deprived of a vehicle route to the Belle Isle park has been a great hardship for the city of Detroit.

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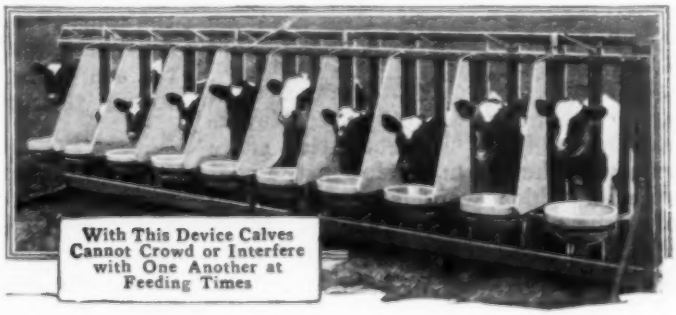
BIG SOUNDING BOARD AIDS CONVENTION SPEAKERS

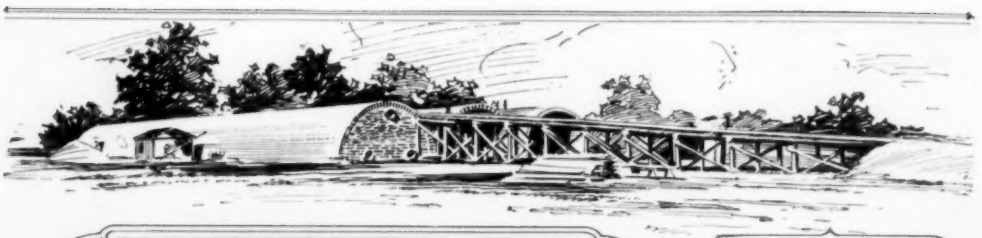
ONE of the objects which first attracted attention in the Coliseum at Chicago, as it appeared during the recent national Republican convention, was the huge sounding board which was suspended above the speakers' platform. In the above illustration it appears like an inverted white pyramid, the sides of which, to improve the sound-reflecting effect, are concave. The shape of the board and the resonant qualities that it possesses made it possible for speakers with strong voices to be heard by many even in remote parts of the hall, which on several occasions was packed with approximately 15,000 persons.

NEW FEEDING RACK DEVISED FOR SMALL CALVES

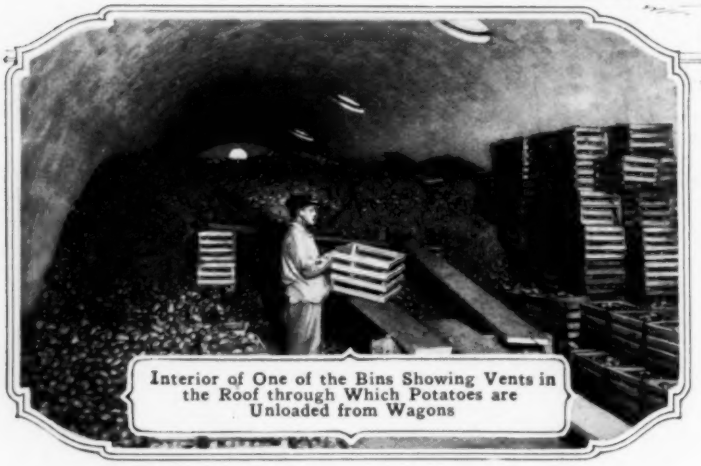
To prevent young calves from crowding or interfering with each other at feeding times, a Wisconsin man has developed a stanchion rack that is provided with individual earthen bowls. Partitions separate the various stalls and make it impossible for one animal to reach another. The purpose of this is to obviate their nursing each other's ears, a common practice among calves which is frequently detrimental to their welfare. The rack is made so that the stanchions may be locked or opened either separately or collectively. The framework is of stanch, durable wooden construction.



With This Device Calves Cannot Crowd or Interfere with One Another at Feeding Times



Tunnel-Shaped Buildings of Hollow Tile in Which 75,000 Bushels of Potatoes can be Stored



Interior of One of the Bins Showing Vents in the Roof through Which Potatoes are Unloaded from Wagons

FARM BINS KEEP POTATOES UNTIL MARKET IS GOOD

A building for storing potatoes which has a capacity of 75,000 bu. has been erected on a large New York farm, the scientific cultivation of which was described in Popular Mechanics Magazine for June. The structure is divided into three connected arched tunnels made of hollow tile cemented over. Each inclosure is 12 ft. high and 20 ft. wide at the bottom. Openings at the top and ends permit the air to circulate freely. After a successful test of one of the tunnels last winter, the farm managers believe they have erected a building which has the proper ventilation and maintains an even temperature in which potatoes can be stored until such times as the market price is favorable for selling. Long trestles serve as approaches to manholes in the roof through which wagons are unloaded. It is the plan of the owners to sink a railroad track beneath the central tunnel in order that cars can be loaded by gravity; such an arrangement has the additional advantage of not exposing the potatoes to cold in winter. The building is located near the potato acreage, so that long-distance hauling is unnecessary. The doorways which connect the three vaults are provided for the convenience of the men in handling the potatoes.

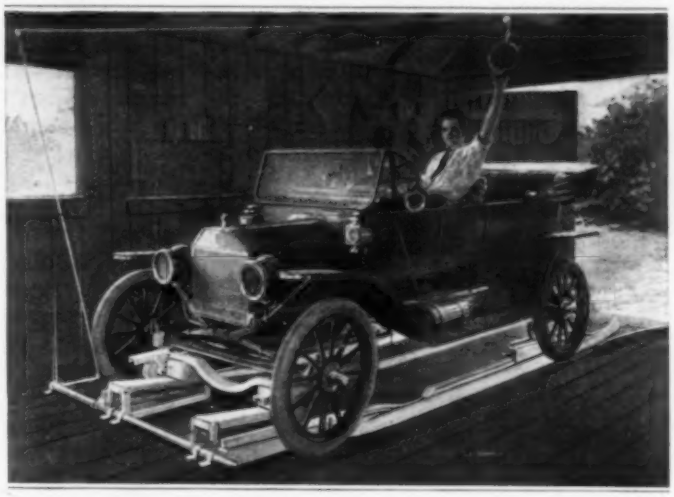
STREET CAR THAT RUNS ON RAILS OR ROADWAY

In Bradford, England, where the street-car facilities are inadequate, an experiment is being tried with a vehicle which can run on either the street-car rails or a roadway. It is equipped with a trolley pole, with apparatus for taking current from an underground track, and also with electric accumulators. The plan is to run the car on the track as close to its destination as possible and then complete the journey on the road, obtaining current from the accumulators. The latter are said to have capacity enough to run the vehicle several miles.

¶The widening of the Panama Canal, incident to dredging that followed the slides at Gaillard cut, has formed a body of water 600 ft. wide and a fourth of a mile long, now officially designated as Goethals Lake.

DEVICE LIFTS AND HOLDS CAR OFF GARAGE FLOOR

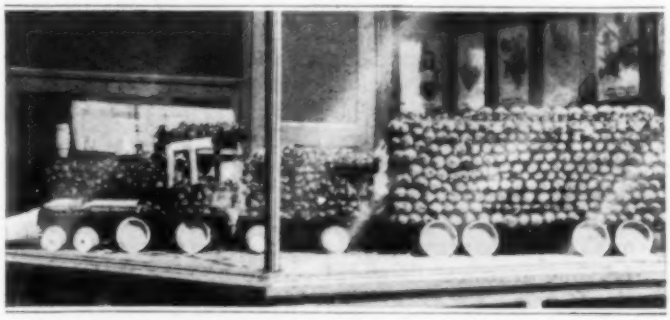
A special garage trackway and carriage has been designed to lift and hold a car just off the floor. The device is intended to relieve the tires from strain while the car is idle, to keep them off the oil-stained floor, and hold the automobile in a position where it can be easily repaired and washed. The carriage consists of a low four-wheeled framework with hooks at its forward end to engage one of the car's axles just as the automobile reaches a point immediately over the carriage. The track follows two slight inclines, one being for the forward carriage wheels and the other for the rear. The slants are upward toward the rear of the garage. A car entering the building is directed by guides each side the carriage until the axle engages the hooks. Momentum serves to carry forward both the car and its carriage a short distance, the rear carriage wheels mounting the rear incline of the track and the front mounting its incline. Adjoining the latter are two slanting friction tables which bring the carriage to a stop and hold it firmly in place. A rope suspended over the seat is attached to a lever that is used to trip the tables and allow their load to roll back toward the entrance. The device can be easily installed in any garage.



A Trackway and Carriage Which Automatically Lifts a Car off Its Wheels as It is Driven into a Garage, and Holds It until Released

TRAIN MADE OF BULBS AND FLOWERPOTS

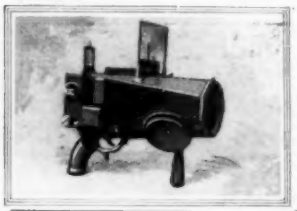
A miniature railway train made entirely of bulbs, flowerpots, and a few wire receptacles, constituted the principal feature in a recent garden display of a firm in Des Moines, Ia. Pots variously arranged served as wheels, cowcatcher, steam cylinders, bell, etc. Properly shaped wire racks filled with bulbs represented the body of the engine and tender. To form the box car the bulbs were fastened outside of a framework. As far as practicable the bulbs forming each part of the exhibit were of uniform size. The train was surrounded with appropriate advertising.

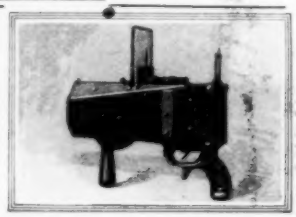


A Novel Window Display, the Central Feature of Which is Made Entirely of Bulbs, Flowerpots, and Wire Receptacles

AIRMEN USE QUEER CAMERA OVER BATTLE FIELDS

When a German aeroplane on reconnaissance duty over the French lines was recently brought down by the allies, an aerial camera of an odd type was recovered intact. It proved to be





Novel Aerial Camera with Revolverlike Handle and Trigger, Captured by French

COURTESY OF L'ILLUSTRATION

a splendid instrument and has attracted much interest among members of the flying corps. At the rear of the case a handle and trigger like those of a revolver are provided, the latter being used to operate the shutter. It weighs about 12 lb. and has an additional handle near the front end so that it can be held with two hands when in use. The lenses are in universal focus and tests have shown that faultless photographs can be obtained with the instrument at heights varying from 160 to 1,800 yd. An outside arrangement is provided to enable an operator to place a yellow screen before the lens without opening the camera.

THEORY AND PRACTICE IN FLYING COMPARED

An interesting comparison of the respective services to the cause of flying which have been rendered by practical and by theoretical men was recently presented to a body of British engineers. In regard to the question of air resistance, concerning which there has been so much controversy, it was declared that practical fliers proved to be right. It was a practical man, too, who first discovered the superiority of a dipping front edge over the flat plane and the same man, it was pointed out, claimed for the dipping edge what is now recognized as a merit, namely, that it created a vacuum at the back of the wing. It was stated further that practical men, mainly, were responsible for the internal-combustion engine. On the other hand, credit was given to the experimental work in organized laboratories by saying that without such efforts the machines of today would not be what they now are.

BABY CHAIR SERVICEABLE IN MANY PLACES

A child's seat for use in automobiles, baby carriages, and in the home has been designed to enable children between the ages of six months and about three years to sit comfortably and correctly, thereby avoiding the harmful postures which they often are compelled to assume when sitting on ordinary seats. This device consists of a small legless armchair, having a foot rest which can be adjusted to suit the needs of the little occupant. A strap across the front keeps the child from falling out. By means of a clamp the seat can be firmly fastened to whatever it is supported by. With it a baby can ride in a car in safety and comfort; in a baby carriage it furnishes a more stable and better-formed seat than a

A Child's Legless Chair Which can be Clamped to an Automobile Seat or to a Baby Carriage

mass of pillows; in the home it can be fastened to the top of a table or the seat of a chair. By extending the foot rest horizontally the chair can be set on the floor or lawn.

UTAH'S NEW CAPITOL BUILT OF NATIVE MATERIALS

Utah's new capitol at Salt Lake City, a magnificent granite structure costing approximately $3,000,000, was recently completed and formally dedicated late in June, during the national gubernatorial conference. Heretofore its capitol has consisted of rented quarters which of late years have proved more or less inadequate. Except at the very outset of its history, the commonwealth has never before owned a statehouse. About 1849, a capitol for the provisional government of "Deseret" was erected at Fillmore. Congress refused the petition of "Deseret" for statehood and the building was abandoned after one session of the legislature had been held in it, as an act was passed at Washington organizing the Territory of Utah with Salt Lake City as the capital. The "Deseret" statehouse, until now Utah's only publicly owned capitol, has for years been used as a town hall. The new structure at Salt Lake City has been built, with the exception of the steel used in it, almost entirely of native materials. The granite used in its walls is from the same quarries that furnished the blocks for the great Mormon temple.

The Old Capitol Erected Years Ago for the Provisional State of "Deseret," Now Used as Town Hall at Fillmore, Utah

GREECE HAS NEW RAIL LINK

At last Greece has been connected with the rest of Europe by rail. The last link, 56 miles long, between Pappapuli on the Thessalian frontier and Gilda on the Saloniki-Monastir line, has been completed, according to reports from Athens. This means that when the war is over through trains—with sleeping and dining cars—will be run from Paris to Athens. It is believed that the time required to traverse the overland line will be shortened to 60 hours. At Athens 20 powerful American locomotives are waiting to draw the trains over the new route, much of which is very picturesque. Temporary bridges of wood have been built until after the war.

Utah's New State House at Salt Lake City, Which was Recently Completed and Dedicated

EUROPEAN ATTITUDES SHOWN BY CURRENT WAR MEDALS

Several interesting war medals have recently reached America, one of which

The Sinking of the "Lusitania," as Viewed from a Purely German Standpoint, is Presented by This Work in Bronze

glorifies the destruction of the "Lusitania" and gives a clear idea of the German attitude toward the catastrophe. This is cast in bronze and bears on one side an impression of the great liner, carrying a gun and military aeroplane on deck, curiously, as it disappeared beneath the waves. The legend, "No contraband!" is displayed above it, and, beneath, the inscription, "The great steamship 'Lusitania' sunk by a German submarine May 5, 1915." The date is obviously incorrect. The opposite side of the piece shows the figure of Death standing in the office of the Cunard Line selling tickets to passengers. The words, "Business first," are at the top.

Both Faces of the Premature Medal Cast in Anticipation of the Fall of Paris before von Kluck at Outset of War

A portrait of General von Kluck appears on one side of a silver medal struck at the outset of the war in anticipation of the immediate capture of Paris by the Germanic forces. Fury, depicted as a nude woman, is shown astride a horse, holding a torch aloft and riding at speed over a city in flames. "To Paris, 1914," is the inscription it bears. Because of the failure of von Kluck's drive upon the French capital, the first issue of the premature medal was suppressed and another struck without the inscription.

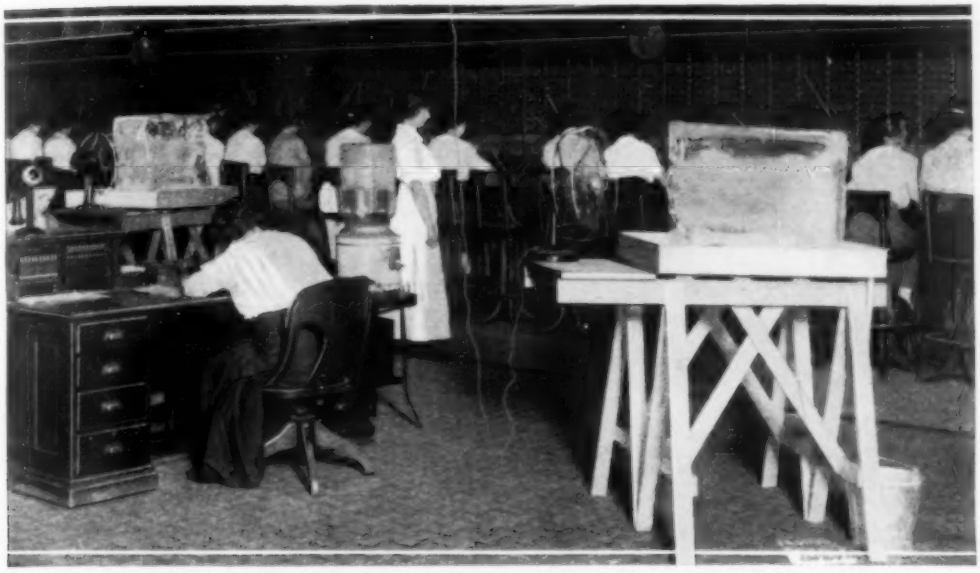
Still another Teutonic medal, this in bronze, bears a globe showing the outline of Europe and Africa. A naked sword extends across Britain and northern Europe and on it sits a crowned German eagle. An advancing army appears in the background. "We Germans fear God, nothing else in the world," is the inscription. On the opposite side the figure of a German soldier waving a battle flag and striding over the prostrate body of a Frenchman is shown.

War medals are not so common in France. One is in the possession of a Bostonian, however, and presents, on one side, an autographed portrait of General Joffre. On the opposite surface the figure of Victory hovers over a "75" gun on which stands a triumphant cock. "For right and freedom" is the legend it carries.

The Crowned German Eagle, a Sword Laid across the Outline of Britain, and a Teuton Treading over a Fallen Frenchman

PHOTOS COPYRIGHT, BOSTON PHOTO NEWS CO.

French Medal Bearing on One Surface the Legend: "For Right and Freedom," and on the Other a Portrait of General Joffre



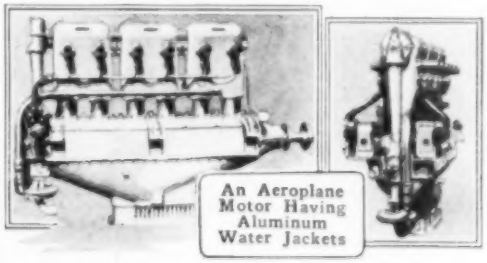
Fans and Cakes of Ice Kept the Operating Room Cool during Days of Excessively Hot Weather

ELECTRIC FANS AND ICE KEEP WORKERS COOL

During a period of excessively hot weather in midsummer when the usual cañon breezes failed to bring relief, various schemes were worked to lower the atmospheric temperature in Salt Lake City office buildings. A local telephone company made use of a simple, although not new, plan which gave very satisfactory results. Several wooden frames supporting zinc trays, large enough to hold 100 lb. or more of ice, were constructed and set in different parts of the operating room. At one side of each of these was a small platform on which an electric fan was mounted so that the air currents created by it would be blown over the ice.

NEW AEROPLANE MOTOR HAS SPECIAL FEATURES

Considerable interest attaches to a new motor which has recently been completed for a tractor aeroplane made by a San Francisco air-craft concern because it embodies several special features. The six steel cylinders of this motor are turned separately and connected in pairs by aluminum water jackets, which by a special process are made perfectly water-tight without the use of gaskets. A shaft up the front of the engine drives the water pump as well as the camshaft, which is fully inclosed; special couplings between each pair of cylinders permit the camshaft to be taken apart quickly so that repairs on any pair of cylinders can be undertaken without delay. The motor is equipped with dual ignition throughout. An oil pump maintains a pressure which can be instantly varied, by a hand regulator, from 10 to 70 lb. All oilways save one to the camshaft are cast in the case itself. An oil radiator

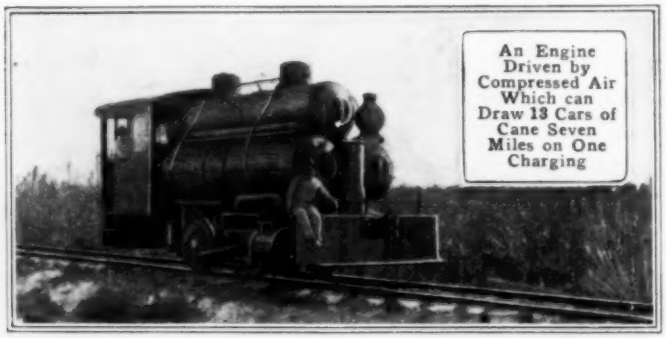


An Aeroplane Motor Having Aluminum Water Jackets

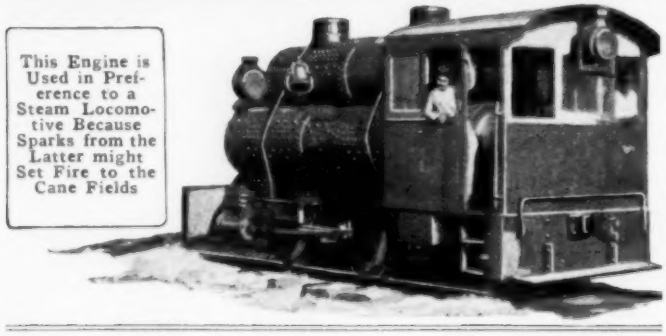
furnishes large cooling surface for the oil. The pistons are of aluminum alloy. The motor weighs 480 lb., and at 1,350 revolutions develops 135 horsepower.

COMPRESSED-AIR ENGINE USED IN CANE FIELDS

A compressed-air locomotive, believed to be the only one of its kind in Cuba, is employed by a sugar-mill company in that island in preference to an ordinary locomotive because the former throws off no dangerous sparks and can be operated very economically. Experience in the cane fields has shown that thousands of acres of valuable crops can be quickly destroyed by fires started by locomotive sparks. To avoid this danger an engine was built which will draw 13 carloads of cane seven miles on one charge of compressed air. Running along the tracks which extend through the fields, 3-in. supply pipes were laid to various recharging stations. The maximum air pressure used is 1,100 lb. per square inch. The cost of compressing the air is practically nothing, for ground cane is the fuel used, and of this there is an abundance. The engine also saves the wages of a fireman and $10 worth of coal daily.



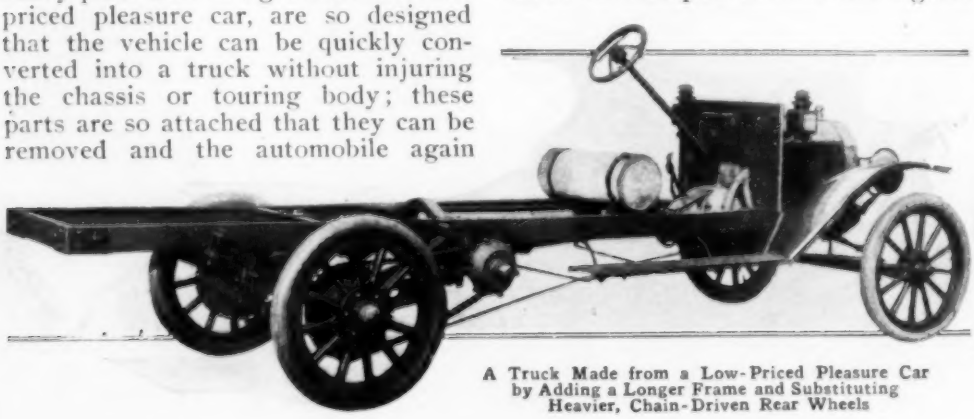
An Engine Driven by Compressed Air Which can Draw 13 Cars of Cane Seven Miles on One Charging



This Engine is Used in Preference to a Steam Locomotive Because Sparks from the Latter might Set Fire to the Cane Fields

CHANGE TOURING MOTOR TO TRUCK AND VICE VERSA

A truck body, and certain other heavy parts now being made for a low-priced pleasure car, are so designed that the vehicle can be quickly converted into a truck without injuring the chassis or touring body; these parts are so attached that they can be removed and the automobile again transformed into a five-passenger car. To change the latter into a truck, the rear wheels, rear spring, and radius rods are removed. A heavier, longer frame is clamped around the lighter



A Truck Made from a Low-Priced Pleasure Car by Adding a Longer Frame and Substituting Heavier, Chain-Driven Rear Wheels

one; chain-driven wheels, with solid-rubber tires, and a heavier axle take the place of the regular rear wheels. The light rear axle is transformed into a jackshaft, a special sprocket for driving the chains being telescoped over the brake drums. There is no change in the control or tread, but the gear ratios are changed to approximately 7.25 to 1 on high speed, and other speeds correspond. The truck has a wheel base of 127 in. and a capacity of 2,000 to 3,000 lb. A somewhat similar body and rear running gear, attachable to the same make of car, but not designed with a special view to the convertible feature, is also on the market.

NOVEL APPEAL TO USERS OF GOLF COURSE

An unusual way of asking golfers for their coöperation in keeping their course in good condition and in refraining from undesirable practices is employed by a Cincinnati golf club, which has placed a large sign beneath the bulletin board on the first tee of the course. It reads: "Treat the course as though you loved it." Every player is sure to see the request before starting over the links. A similar sign has been put up at the tenth hole.

CONCRETE MIXER IS USED ALSO AS ROAD ROLLER

At small expense a western contractor has converted a large, mobile concrete mixer into a quite efficient road roller so that it may be used for dual purposes on paving jobs. Steel tires, 24 in. in width, were slipped over the wheels and made fast by filling the outer half of each with a rich mixture of sand and cement. This provides a 4-ft. bearing surface, while the weight of the machine enables an excellent compression to be obtained on subgrade rolling. The chief advantage is that the expense of shipping a steam roller to towns where only a small amount of work is to be done is in this way eliminated.

Using the Converted Mixer as a Roller in Building Concrete Pavement in Iowa Town

LILIES AND GOLDFISH IN CONCRETE STUMP

The use of concrete for ornamental purposes is keeping pace with the increasing number of ways in which it is used for practical services. An especially attractive example of ornamental concrete work is to be found in the grounds of a Los Angeles residence, where a container for water lilies and

An Ornamental Stump Made of Reinforced Concrete and Containing Water Lilies and Goldfish

goldfish has been constructed to resemble a large stump that has been cut off rather close to the ground. A little distance away it has every appearance of a real stump. The concrete is reinforced with expanded metal.

SELF-CONTAINED EAR PHONE MADE LIKE A LORGNETTE

One of the latest designs of the ear phones—the instruments which assist deaf persons to hear more clearly—

has as a special feature the fact that it is an entirely self-contained unit, requiring no wires or other connections. To the side of a small round ear piece is attached a handle resembling the handle of a lorgnette. This member contains a small battery which supplies the necessary electrical energy for the operation of the instrument. By means of an inconspicuous switch the current can be turned on as desired simply by pressure of the thumb, or if preferred the switch can be locked to remain closed. When not in use the ear phone can be placed in a handbag or in the pocket.

PROGRESS IN APPLICATION OF X-RAYS TO METALLURGY

The taking of X-ray photographs of metal to determine the extent and location of pores and other defects in it has now been so perfected that the principal factors necessary in securing helpful radiographs of castings are quite thoroughly understood. Experiments in this sort of X-ray photography were made public about a year ago and commented on in Popular Mechanics Magazine at that time. Among the essential facts which have been established in the year of research are: the proper time of exposures in making radiographs of castings of various thicknesses; the size of the smallest air bubble that can be detected in various thicknesses of metal, and the proper regulation of the electric current to obtain the maximum of efficiency. Stereoscopic radiographs of copper castings have been taken so that not only the size but also the depth of various pores was ascertained. Formerly it was necessary to machine off layer after layer of many sample castings, and even then the experimenter had to build up a mental picture of the metal's defects on the basis of what he had exposed.

CAP CRIMPED AND FUSE CUT AND SLIT BY ONE TOOL

For use in blasting operations, a combination fuse cutter, cap crimper, and fuse slitter has been devised in the

engineering department of the Wisconsin College of Agriculture. The instrument is similar in pattern to pruning shears. The main part of the blades is used for crosswise cutting, while the slitting is done with the tip end of the upper blade, which is especially ground for this work. Riveted to the end of the lower blade is a piece of metal which forms a cutting board on which the fuse is held. The casing is split only on the upper surface so that it is easy to prevent the powder from falling out. A cap can be fastened to a fuse by a crimping device provided under the pin.

Concrete Bridge on Leeds Highway in Alabama Built by Convicts and Recently Dedicated with Big County Celebration

SOUTHERN ROADS IMPROVED WITH CONVICT LABOR

In many parts of the South splendid highway systems are being established with convict labor. This is especially true in Georgia, Alabama, and certain neighboring states, where already great strides have been made. In the districts where the most work has been accomplished, pronounced community spirit has been shown; a thing which without doubt has contributed considerably to the success of the local good-roads campaigns. As an indication of the coöperation that exists in some parts, more than 2,000 persons assembled a few weeks ago to participate in the dedication of a concrete bridge across the Cahaba River at Lovick on the Leeds Highway in Jefferson County, Ala. The bridge is the largest of its kind ever built in the state with convict labor, while the road is intended as a part of the Southern National Highway which extends from San Diego to New York. The official opening of the bridge was made a gala event by the whole county.

TRAFFIC SIGN EFFECTIVE DAY AND NIGHT

A California automobile club has recently erected an illuminated danger sign at a busy street intersection in Los Angeles. It is of metal and at night is illuminated by an electric bulb which sheds its rays down on the words of the notice. The warning is printed on both sides of two leaves of metal which intersect each other at right angles so that a car coming from any one of four directions can see the legend, which reads "Keep to right." Projecting upward from the top of the framework is a red bulb which adds to the conspicuousness of the notice at night. It is proposed to place these signs at a number of important street crossings.

RAILWAY TO ERECT BIG HOTEL IN NEW YORK

A hotel, 20 stories high and containing 2,200 rooms, will be erected by the Pennsylvania Railroad opposite its terminal in New York City. It will occupy a site 200 by 400 ft. and will be set back 15 ft. from the line, to allow for a wider sidewalk. The hostelry will be connected with the depot by a subway; it will likewise have direct communication with the express station of the Seventh Avenue subway, and will be within short distance of other transportation lines, existing and contemplated. In fact a person in the hotel will be able to travel to a destination in any direction, inside or outside the city, without going from under shelter. Courts over 40 ft. wide will divide all but the lower floors so that each room will have plenty of light. The longer courts will face south, and since the railway station does not rise above the level of the first bedroom floor, the building will have an exceptional amount of sunlight. On the twentieth floor will be open-air dining rooms facing the Hudson River. The site of the structure is assessed at $2,500,000, and the cost of the building estimated at $9,000,000, including furnishings.

Twenty-Story Hotel to be Erected Opposite the Pennsylvania Station in New York City

NEW THEORY AS TO ORIGIN OF LIGHTNING

Years of careful study have failed to produce an entirely satisfactory explanation of the way in which lightning originates, but a scientist has proven that when drops of water are broken up they become charged positively while the surrounding air receives a negative charge; this furnishes the basis for a hypothesis regarding lightning which seems to solve many of the questions involved. It is known that the voltage of a cloud can be greatly raised by the combination of many fine water particles into larger drops which fall to the earth. A large drop carries the combined charges of the smaller units which joined to form it, though its surface area is much less than that of all the little drops; hence the surface density of the electrical charge is much greater. When the drops begin to approach the earth the voltage may be high enough to cause an electrical discharge across the intervening space. The new theory referred to endeavors to show how the smaller particles become charged elec-

trically: It is pointed out that since a thundercloud is known to form in a rapidly ascending air current, large drops of water may be broken up by this current and consequently electrified; then, it is thought, when the current spreads out and the vertical velocity diminishes, the drops grow in size and fall, only to be broken again by an upward current. In this way sufficient electrical current is finally accumulated to cause a discharge.

MOTOR-TRACTOR AMBULANCE FOR SUFFERING ANIMALS

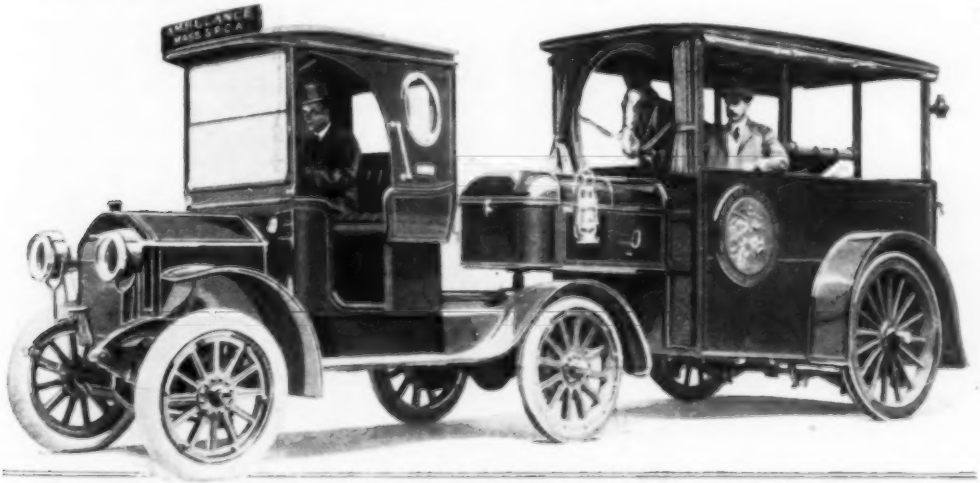
An up-to-date ambulance of the tractor type designed to carry injured or sick horses, or other beasts, has been added to the equipment of the Angell Memorial Hospital in Boston, which is connected with the Massachusetts Society for the Prevention of Cruelty to Animals. The entrance to the tractor is at the rear and the floor is close to the ground so that it is easy to load and unload the suffering patients. Special apparatus for keeping the animals still is provided; at the ends and sides are curtains which can be drawn to keep out the cold and wet. The two wheels have solid-rubber tires. The motor which draws this vehicle matches it in general appearance and is capable of good speed.

SPLIT CURVES CONSTRUCTED ON HIGHWAYS FOR SAFETY

For the purpose of preventing possible collisions at sharp curves on rural roads, the State Highway Commission

Showing Construction of Divided Curve on a State Highway in Minnesota

of Minnesota has adopted a safety-first scheme which is undoubtedly meritorious. It consists of a split roadway formed by constructing a crescent-shaped bank in the middle of the thoroughfare. Obviously this separates the traffic, causing cars traveling in either direction to keep to the right while rounding a turn. Many drivers have the habit of taking the wrong side of a road when negotiating an abrupt curve. This is a very dangerous practice, and one which the crescent bank obviates.



Ambulance of the Tractor Type Which Is Part of the Equipment of the Angell Memorial Hospital for Animals in Boston

A Modern Ten-Story Office Building in Wheeling, West Virginia, in Which the Color Scheme of the Walls and the General Design Produce a Very Pleasing Effect

BEAUTY AND STRENGTH IN OFFICE BLOCK'S DESIGN

A ten-story office building in which strong, artistic lines and a striking color scheme have been combined to produce a beautiful effect has recently been completed in Wheeling, W. Va. The building stands on a corner with low structures on either side. It is finished in white and green glass-glazed terra cotta, the walls up to the third story being entirely of white and marked by heavy arched windows and elaborately wrought designs. A heavy cornice in green and white and railed balconies set off the tenth story from the rest. Extending between the tenth story and the second, the walls for a width of several feet either side of the corners are smooth and white. Between these upright sections, which serve to give strength and unity to the design, the walls are of decorated green terra cotta and are divided into long panels or sections that extend from the third to the ninth floors, inclusive. The building is regarded as one of the finest examples of modern business architecture to be found in Wheeling and vicinity. Reinforced concrete was used throughout the entire structure.

ELECTROMAGNETIC VACUUM SCALES

A scale which operates on the same principle as the electromagnetic instruments that accurately determine the intensity of an electric current has been devised to replace the ordinary chemical balance. For the pan of this scale upon which the weights are placed a horizontal circular wire coil is substituted and above and below this movable coil are two larger fixed coils. An electrical current flows through the movable coil and the lowest coil, in one direction, and through the uppermost coil in the opposite direction, so that the electromagnetic forces necessary to balance the object being weighed may be obtained by suitably adjusting the current.

TEACHING CHILDREN TO SWIM

by F. J. BRUNNER
COACH-WASHINGTON SWIMMING CLUB

PART II
PRACTICING IN WATER

THE utmost care must be taken for the first time in the water. Wading in and carrying the child is to be avoided, as even in a small pool it is rather terrifying for him to be beyond the reach of land. Wait for a bright sunshiny day when the water is rather warm, and prepare his mind by talking about how delightful it will be to go in. If at a beach, and the water is calm, the beginner can play around the edge, wading, sitting, and lying in the very shallow parts. Lying on the chest with the head toward the shore and the legs supported by the water, and holding to the sand with the hands, the feet can be made to splash as they did in the tub.

Ready for the Front Dive: This Child Is Two and One-Half Years Old

If the swimming place is without a beach, as in a pool, the first attempt had better start with a jump from the bank, and in the first trials the legs, from the knees down, should be the only part of the body to touch the water. From day to day the "dive" can be made deeper and deeper until the face goes under. Meanwhile, frequent short rides on both the back and chest of the instructor can be given to keep the child interested. At the proper time, when the little fellow is perfectly at ease, he should be asked to stick his face under, first being shown how.

Just as soon as the face can be forced under of the child's own volition, the teacher can step back two or three feet and hold out his hands for the diver to grasp as he strikes the water. Lower the hands from time to time so that the face will get splashed, and finally go under entirely.

At the same time the front dive is taught, the little one should be allowed to dive backward. After the strangeness wears off, the head can be thrown back to make the body go in perpendicularly.

The breathing exercise in the water

The Child should be Given Frequent Short Rides on the Back or Chest of the Instructor

Breathing Exercises in Water: Pupil Hangs on to a Support and Keeps the Arms Straight

can be started at any time. The head and breath are managed in the same way as they were on land in the basin, but the pupil hangs on to a support and keeps his arms straight. At a beach the head faces the shore and the fingers dig into the sand. The breathing comes easier and easier as the body is got on a horizontal plane by kicking the legs from the hips.

A successful way to give a child confidence is to shove him, on either his chest or back, from one person to another four or five feet apart. Gradually increase the distance, and it will be found that he will unconsciously attempt to use his limbs. To encourage him to do so, tell him to splash.

The Front Dive at Three and One-Half Years: Confidence has Increased with Training

Teach the pupil to turn on his back as was done in the bathtub, and support his head. Have him keep his hands and arms under the water all the time, and by and by he will find that he can float unaided, provided he is not heavier than water. Those who are cannot float under any circumstances without moving the limbs.

When the little swimmer has mastered the front dive, allow him to dive off, and, upon coming to the surface, drift along on his face, doing what is known as the dead man's float. Before bringing his head up, he expends part of his breath by blowing bubbles. The ability to turn to his back is very important. In fact, at the end of every stunt a beginner should do this, so that if he ever finds himself in difficulty, he will instinctively turn. To assist in keeping afloat on the back, the sculling movement is invaluable, especially if the head has to be raised to cough.

The next step is the dog paddle. Have the child take a dive and, upon rising to the surface, drift along with the face under. This drift will keep the body up long enough to enable the pupil to take two or three strokes before the breath is exhausted. Let him

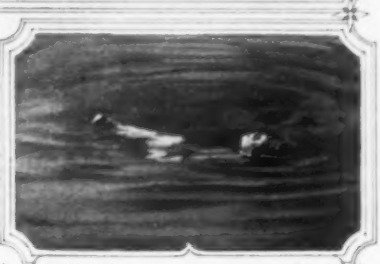
Ready for the Back Dive

The Child Shown Is Four and One-Half Years of Age. The Plank Is About Five Feet above the Water

The Front Dive from a Landing at Four and One-Half Years

Floating: Swimmer Here Five and One-Half Years Old

Drifting on the Face, or the Dead Man's Float



Sculling Head First on Back in Potomac River

endeavor to use the crawl arm movement that was learned on land, and in attempting it he will pull the water toward his chest, working the forearms alternately very much as a dog uses his paws while swimming.

Many children can recover one arm in the air at the start, and a few will recover both, but practically all will revert to the dog paddle when breathing is attempted. Gradually, however, the crawl can be developed from this stroke. A child will instinctively take a breath if his lungs are empty. The great difficulty will be to get him to exhale. Command, "Blow out." When breathing is first attempted the head is raised in front, but gradually the ability to turn it is acquired. Watch for and overcome the tendency to take the stroke too fast.

Water Wings Placed at the Juncture of the Legs Provide Support When Practicing the Leg Kick

After sufficient progress has been made so that five or six strokes and two or three breaths can be taken, start kicking the feet. Just let him alternately kick each foot up and down, and the timing will take care of itself without thought. From then on, watch for the tendency to drag the knees forward as if crawling on the hands and knees. Sometimes, even two or three years after learning to swim, this fault develops in the leg kick so strongly that it causes the body to stand upright in the water. To overcome it, have him hang on to a support and practice the kick, or lie on a sloping beach in water shallow enough to allow the knees to touch bottom. Water wings may be placed at the juncture of the legs, so that the support is given as far back as possible.

A shove-off from the side of the pool is a help in

learning the back stroke, and a source of much pleasure afterward. Grasp the rail or other support, bring the feet up as near the surface as convenient, and, letting go, push back hard, and straighten out the body. Before shoving off, exhale, and inhale just as the feet leave the wall, while the body is straightening out. Keep the arms at the sides, the legs straight, and the toes pointed along the line of the body. If at a beach a shove-off from the bottom will be necessary. Stand in water up to the armpits, sink down by bending the knees and bend backward until the head is submerged with the exception of the face, and, rising on the toes, shove the body backward by straightening the legs. Use the sculling movement of the hands until the feet come to the surface.

After a shove-off let him try the arm movement for the back stroke, as he did it on the land. There will be very little to teach—just a matter of keeping an eye on the swimmer and offering encouragement or cautioning, "Slowly." The alternate over-arm on the back can be safely taken up at the same time.

Regardless of age, when the child has accomplished the dog paddle and the arm movement of the back strokes, begin teaching the other strokes. There is no particular choice as to which one to teach first.

For the single over-arm side stroke, start with the flat dive or shove-off and drift along on the face. Then turn on the side and use the upper arm as was learned on the land. The under arm is used in the same manner as it was in the land exercise, but it is dipped straight down and brought up in front of the abdomen. Then, without pause, it is brought to its original position by bending the elbow and bringing the hand toward or past the chest and back to its starting point. The arm is, of course, kept in the water during its recovery. Once the knack of keeping squarely on the side is acquired, the rest of the stroke is developed as it was on land, always starting the trials while the body has a forward motion from the dive or shove-off.

After the single over-arm is learned, have the under arm recovered out of the water by causing the body to roll, when it becomes the trudgen or double over-arm stroke. If desired, the arms, on their recovery, can be carried forward in graceful curves instead of the stiff-arm method.

It is better to learn the breast-stroke kick while sculling on the back after a shove-off from the side or bottom. When it can be swum well enough to make progress without the use of the arms, combine the arm movement for the back stroke and the breathing. The combination is the back stroke, and after it is learned, turn over and try the breast stroke. It will be found surprisingly easy. The legs are recovered at the conclusion of the arm pull and the kick immediately follows. Blowing the hands away from the chest and keeping the face under water while doing so will easily overcome any difficulty with the breathing. The alternate over-arm on the back will be found very simple to learn after the land practice.

It has been suggested by writers on swimming subjects that it is almost impossible to teach very young children to swim, because a child's head is so much heavier in proportion to the rest of his body that he has not the strength to keep it out of the water to enable him to breathe. It will be noticed that, in methods advocated in this article, the head is entirely supported in the water part of the time, and partly supported at all times when swimming on the chest, and, while on the back and side, it is entirely supported by the water at all times. The little ones, of course, will accomplish more on the back than on the chest.

In all branches of athletics, children having organic trouble should perform under the advice of a physician. The same rule holds good in swimming, but there is no reason why one who has lost a limb should not get his chance as well as the more fortunate. The child with but one leg offers an

easy problem, as the heaviest part of the average person in the water is from the waist down. However, the one-armed pupil is more difficult, and the time should be taken up with teaching him to dive and float, to turn to the chest and back again, and in getting him used to the water until he is old enough to learn the scissors kick. Then he can be taught the side stroke, swimming so that the armless side will be up, as the under arm in the side stroke furnishes the more power.

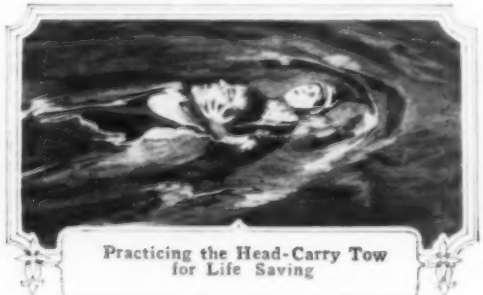
The most difficult child to teach is the one who is unable to float because of his specific gravity. Use patience plus, and do all that can be done to familiarize him with the water. Develop a good flat dive, so that the impetus will keep the body afloat while the limbs are being moved. As the stroke is perfected, the body will stay on top longer and longer until actual swimming is accomplished.

The probable length of time it will take to teach a child to swim is hard to say, but one five or six or seven years old, after having spent the winter practicing at home, should be able, the first summer, to keep afloat on his back for 15 or 20 minutes and swim the dog paddle about 25 feet. The main thing at this early age is to use great patience and kindness, combined with careful effort, arousing enthusiasm and not allowing him to be frightened. When he has once learned, there is no reason why all of the modern strokes should not be mastered before he is 12 years of age.

The Front Dive at Five and One-Half Years: The Body Is Now under Good Control

Doubtless the illustrations accompanying this article will prove the best assurance of what can be accomplished with a healthy child. The little subject is shown first at two and one-half years of age attempting the front dive. Her timidity and baby flabbiness are apparent. By the time she is five and one-half years old, however, these have entirely disappeared. She has become well poised, fearless, and has developed fine muscular control. These will prove an asset to her, both morally and physically, throughout her life.

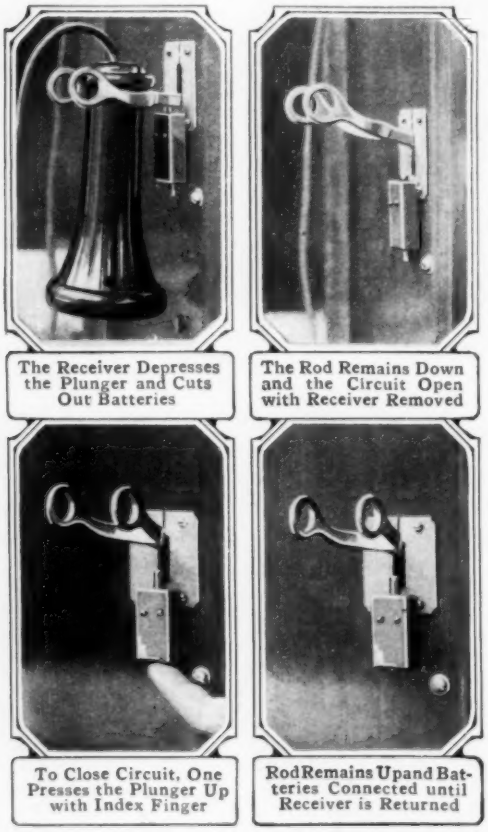
Motionless Floating: Not Possible if Child Is Heavier than Water



Practicing the Head-Carry Tow for Life Saving

BATTERY CUT-OUT IS MADE FOR RURAL TELEPHONES

Besides being annoying, the time-honored practice, observed by inquisitive subscribers on rural telephone lines, of secretly listening to neighborhood conversations, represents a source of expense to a company. When old-style instruments are continually used in this way the batteries are soon exhausted and new ones must be installed. To obviate this leakage, a simple cut-out has been devised which saves batteries but does not prohibit curious individuals from entertaining themselves by absorbing local gossip. It consists of a spring arrangement held in a small metal case which may be screwed below the switch hook on the outside of a wall telephone. A rod protrudes at the top of the device. When the receiver is in place it presses this down and opens the battery circuit. Should a person merely desire to hear clandestinely others' conversation, he may remove the receiver and listen as long as he wishes without using the batteries. But when he wants to employ the instrument legitimately it is necessary to close the circuit by pushing up the cut-out rod with the index finger.



The Receiver Depresses the Plunger and Cuts Out Batteries

The Rod Remains Down and the Circuit Open with Receiver Removed

To Close Circuit, One Presses the Plunger Up with Index Finger

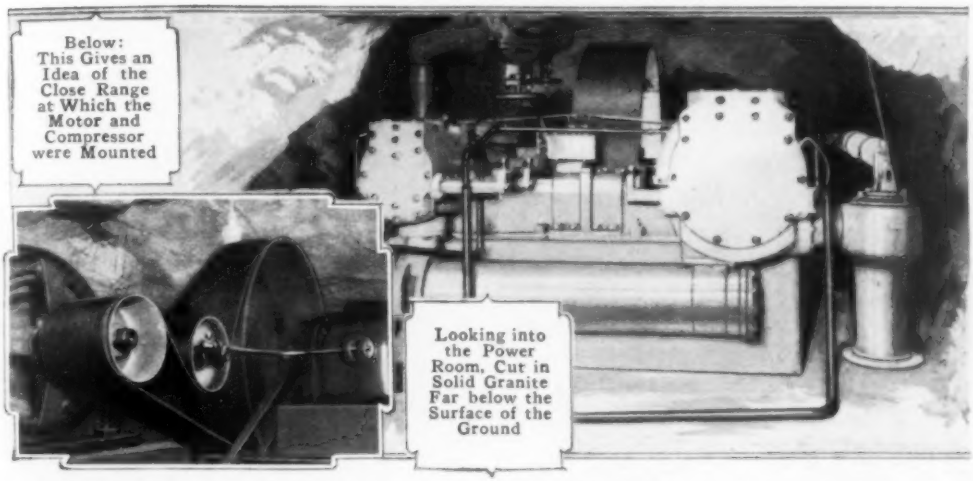
Rod Remains Up and Batteries Connected until Receiver is Returned

ENGLISH EXTRACT OIL FROM WASTE AND WIPERS

Certain English firms are effecting a real economy in their plants by employing a simple mechanical means of recovering oil from waste, rags, and wipers used in keeping the machinery clean. The apparatus used consists of a centrifugal having an outer fixed cylinder in which is inserted a smaller perforated cylinder that is made to revolve at high speed by a steam turbine. The oil-soaked cloths are placed in the inner cylinder, and as it turns, the centrifugal force throws them against the side walls and the oil is forced through the perforations into the outer cylinder, whence it is drawn off. That the oil may be more easily extracted the exhaust steam from the engine is led into the inner cylinder, its heat helping to free the oil from the cloths. The wipers are also recovered, and if dirty, after going through the centrifugal, are washed in ordinary laundry machinery. It is claimed that 90 per cent of the oil in wipers, and the like, can be recovered by the process described. With oil at war prices, this means an important saving.

AIR COMPRESSOR INSTALLED IN SUBTERRANEAN MINE

Because of the danger of snowslides in the winter time, it was not considered advisable to erect a power plant at the mouth of a certain Colorado gold mine, as is ordinarily done. To obviate the difficulty, an air-compressing unit was installed in a chamber, 15 by 25 ft., cut in the granite 1,200 ft. from the surface of the ground. This required



Below: This Gives an Idea of the Close Range at Which the Motor and Compressor were Mounted

Looking into the Power Room, Cut in Solid Granite Far below the Surface of the Ground

that the apparatus be especially constructed so that it could be taken into the mine piece by piece and then assembled. The lack of space made it necessary to mount an electric motor, used for driving the compressor, very close to the latter. Because of this a large floating idler was employed to increase the gripping surface of the belt and insure proper transmission.

COTTON CHOPPER BOON TO PLANTATION MEN

Thousands of hands and months of toil are required in chopping out the cotton crop of the South. Indeed, this arduous task involves almost as much labor as is required in picking the cotton after it has matured. The operation consists in thinning out long rows of the young plants, and is usually done with a hoe, the original seeds having been thickly planted with a drill.

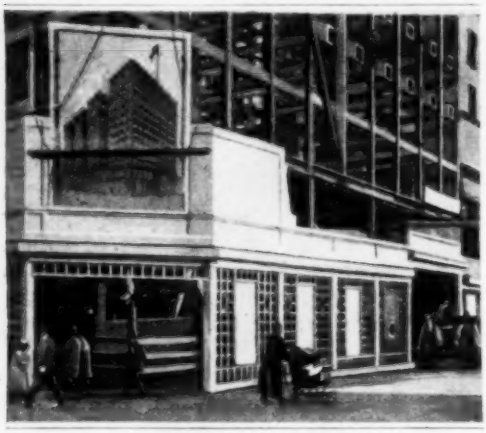
Intending to eliminate if possible most of the labor attendant upon chopping operations, a southern inventor has brought out a device which does the work automatically. It is attached between the two sets of shovels on an ordinary cultivator, and revolves as the cultivator progresses along a row. At equally spaced intervals on the periphery of the wheel, sharp knives come in contact with some of the young plants and effectually chop them to pieces, leaving untouched those that happen to come in the open spaces of the rim. The machine is said to have been very successful in

Automatic Cotton Chopper Thins Out Undesired Plants of a Row at the Same Time Cultivating is Done

trial tests. The fact that the contrivance cuts out certain plants at the same time that cultivating is done makes it saving of the farmer's time.

ARTISTIC TEMPORARY WALK PAYS CONTRACTOR

Contrary to a rather prevalent custom, a contractor in Boston has made

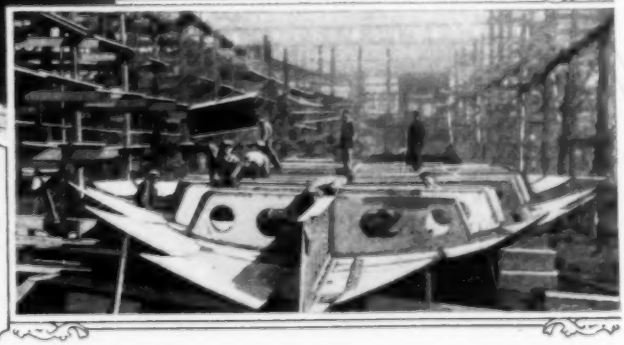


An Artistic Temporary Walk Constructed by a Contractor in Front of a Building Which He is Erecting in Boston

the temporary, sheltered walk in front of the site of an office building which he is erecting, an artistic piece of construction instead of permitting it to be rough and unattractive. Between the posts supporting the roof over the walk, panels of uniform size have been erected which are surrounded with attractive latticework. The panels carry enough advertising to more than pay the extra expense. At the corner, on a large panel erected above the roof, is a colored picture of the new building; and either side of it are brief, neatly lettered announcements by those in charge of the structure. The entire shelter is artistically painted and is also made attractive on the inside.

SHIPYARDS OF GREAT LAKES BUILDING OCEAN VESSELS

Steel ocean-going vessels for Atlantic coastwise shipping are being constructed in the shipyards of the Great Lakes. This is one result of the present great demand for bottoms, due to the European war, which has caused practically everything that is watertight and shaped like a boat to be pressed into service. At Toledo a fleet of six steel vessels, each 261 ft. long and driven by oil-burning engines, is being built for an oil corporation. Two of these have already been launched. Facilities for constructing ships almost three times as large as these are available on the lakes, but the limitation of the Welland Canal, which offers the only outlet to the sea, prevents their passage into the St. Lawrence. This condition governed the length of the schooners now in the course of construction at Toledo.



Adjusting Rudder on New Steel Steamer Built on Great Lakes for Coastwise Trade. Right: Scene in One of the Dry Docks of a Toledo Shipyard Where Ocean Vessels are being Constructed

Dairymen of Napa County, California, Banqueting in the Sanitary Dairy Barn Which Simultaneously Housed 200 Cattle

BANQUET IS HELD IN BARN WHILE COWS ARE MILKED

For the purpose of emphasizing the sanitary condition of the dairy of the state hospital at Napa, Calif., the Napa County Live Stock Association held its annual banquet in the barn where the cattle are kept. Long tables were placed in an area between rows of stalls, and covers laid for 120 persons. In the same room with the banqueters were 200 cows in their stalls. While the men ate, the cows were milked by the employes of the dairy. This barn is modern in all its construction, and is well lighted and ventilated.

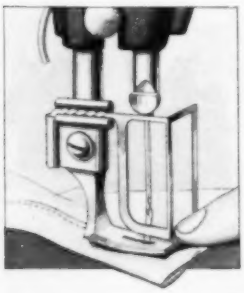
TENT WITH SPECIAL FRAME SUITABLE FOR GARAGE

The manufacture of special tent frames to take the place of the poles and ridge pieces commonly used, has made possible the construction of tents which can be conveniently used as garages. Heretofore this has not been practical because the supporting poles are in the way unless the tent is very large. These tent frames consist of strips of lumber so hinged together that they hold up the sides and also form a gable roof. The guy ropes are attached to the frame instead of to the canvas, thereby relieving the latter of considerable strain. The frame when folded up occupies little more space than the ordinary poles. A tent having a frame of the character described, made especially to house automobiles, measures 8 by 16 ft., with 7-ft. walls and a maximum height of 10 feet.

A Tent Having a Frame Which Requires No Center Poles, Making the Shelter Adapted to Use as a Portable Garage

GUARD FOR SEWING-MACHINE NEEDLES

A very simple safety attachment for sewing machines, designed to prevent an operator being injured by the needle, consists of a metal guard which can be fastened to the presser bar just in front of the needle by the same screw that holds the presser foot in place. The notch into which the screw fits is so shaped that the guard can be set high or low to suit the desire of the operator. The device consists of a slender metal framework which does not obstruct the sewer's view, yet is sufficient to prevent a finger slipping under the needle. By slight pressure it can be swung to the left to permit adjustment or inspection of the mechanism behind it.

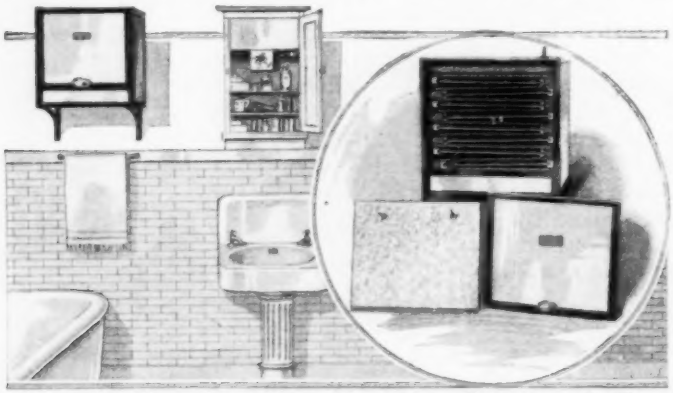


ALUMINUM USED IN MAKING REMARKABLE EXPLOSIVE

The Austrians are reported to use an explosive inside their projectiles which contains aluminum powder as one of its essential ingredients and which possesses extraordinary explosive properties. This compound is known as ammonal and is a mixture of five or eight parts of ammonium nitrate and one part of finely powdered aluminum. It is said that no gun used in modern warfare could resist the power and suddenness of its explosion, consequently it is put inside the projectile and explodes after the latter has left the gun.

ELECTRIC WATER HEATER HAS NEW FEATURES

A compact, instantaneous electric water heater which embodies several new features has been patented recently. It consists of a 20-in. cubical case which incloses several corrugated copper trays placed one above the other; adjacent trays tilt in opposite directions so that the water which enters at the top under pressure flows in a thin layer by gravity over each tray in succession and leaves by a pipe at the bottom which leads down to the tubs and basins. Between these trays are electrically connected heating elements, insulated by porcelain supports, and placed just far enough above the trays to avoid contact with the water which is heated almost instantly by them. This arrangement gives the current a high percentage of efficiency. Since the water is not under pressure there is no danger of an explosion. The heater is connected with a controller which may be located in the bathroom or elsewhere; a single knob is employed to turn the electricity and the water on or off simultaneously. The knob can be set for various temperatures. A low-fusing connection prevents overheating of the heating elements.



This Electric Water Heater Warms Water Almost Instantly as It Flows by Gravity in a Thin Layer over Tilted Copper Trays

GOVERNMENT EXPERTS STUDY PLASTIC FLOW

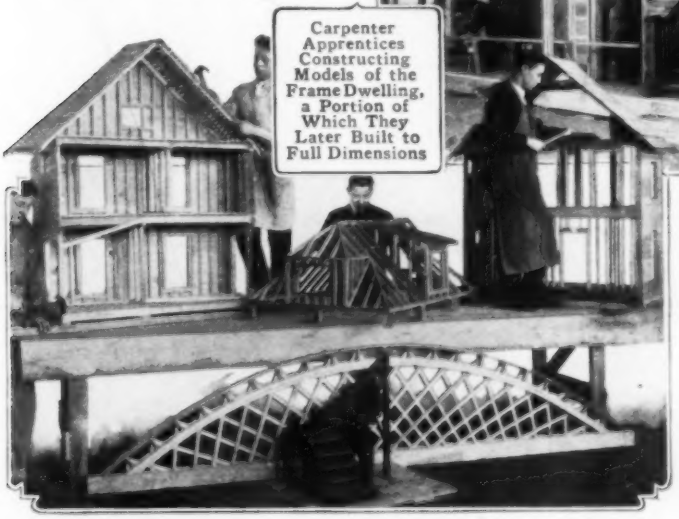
The plasticity of certain forms of matter, such as clay used in making pottery, has been the subject of a recent investigation by the United States Bureau of Standards. This capacity of a material for being molded into a desired shape and then retaining it, has long been regarded as important but never fully understood. Mixtures of clay and water were forced through small tubes and the rate of flow at different pressures was measured. These tests showed that a considerable force was required to start the flow or to overcome the friction between the solid particles. This friction in plastic flow enables one easily to distinguish between a plastic substance and a true fluid, even though the latter may be very viscous, like pitch. The plasticity of materials depends largely on the fineness of the solid particles.

¶Refuse clam shells are now being ground and mixed with other materials to make commercial fertilizer.

APPRENTICES BUILD HOUSES IN TECHNICAL SCHOOL

The construction of one end of a full-sized, two-story-and-attic dwelling within a large room designed especially for the purpose, was a part of the work assigned to students of carpentry in the Carter H. Harrison Technical High School of Chicago. However, before the work on the house was begun, models of the larger building were made by the boys in groups of three. Each student was required to make a complete model of the roof framing and certain details of such interior work as the stairs. In building the full-sized structure all the boys worked together. The plan called for several types of construction, including front and rear porches, a gable dormer, the fitting of window sash, lathing, hanging of doors, shingling, and so forth.

Schoolboys Learning Many Sorts of Carpentry Work While Building the End of a Two-Story Dwelling



Carpenter Apprentices Constructing Models of the Frame Dwelling, a Portion of Which They Later Built to Full Dimensions

DISTINCTIVE COSTUMES FOR OUTDOOR PLAY

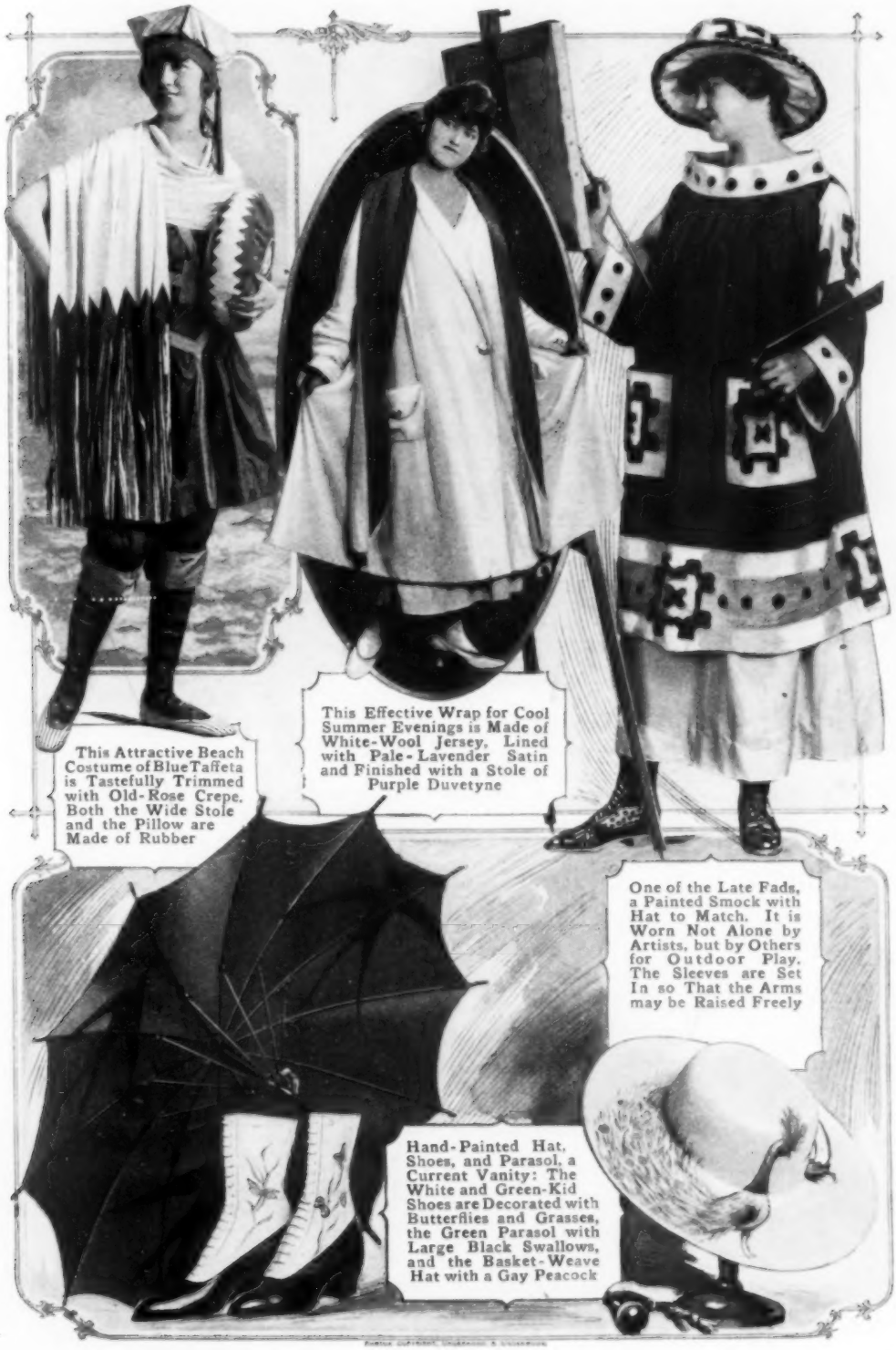
Plain Bathing Costume of Blue Worn over Golden Jersey Tights and Removed upon Entering the Water. The Attractive Satin Wrap Is Reversible

Novel Tennis Jacket of Rose and Black Cretonne in Flowered Pattern: The Collar and Cuffs are Made of Plain Rose-Colored Material Matching That Used as Trimming on the Hat of Gold Straw

Pleasing Outfit for the Girl Archer, Consisting of Blue-Rajah Cape with Kimono Sleeves and a Skirt of the Same Material in White. The Former Is Loose and Comfortable, and Allows Free Use of the Arms

Left: Simple Hat Worn by Delegates to Recent Suffrage Convention at Chicago; Above, a Dainty Parasol for Light Frocks, and at the Right, a Seasonable Vanity—Decorated Sport Shoes of Green Linen and Pink Cretonne

AND THE SEASON'S ODD FADS AND FANCIES



This Attractive Beach Costume of Blue Taffeta is Tastefully Trimmed with Old-Rose Crepe. Both the Wide Stole and the Pillow are Made of Rubber

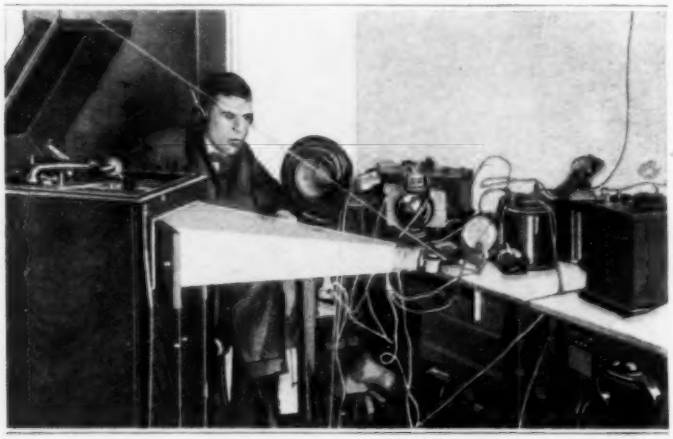
This Effective Wrap for Cool Summer Evenings is Made of White-Wool Jersey, Lined with Pale-Lavender Satin and Finished with a Stole of Purple Duvetyne

One of the Late Fads, a Painted Smock with Hat to Match. It is Worn Not Alone by Artists, but by Others for Outdoor Play. The Sleeves are Set In so That the Arms may be Raised Freely

Hand-Painted Hat, Shoes, and Parasol, a Current Vanity: The White and Green-Kid Shoes are Decorated with Butterflies and Grasses, the Green Parasol with Large Black Swallows, and the Basket-Weave Hat with a Gay Peacock

SENDS PHONOGRAPH MUSIC TO SHIPS AT SEA

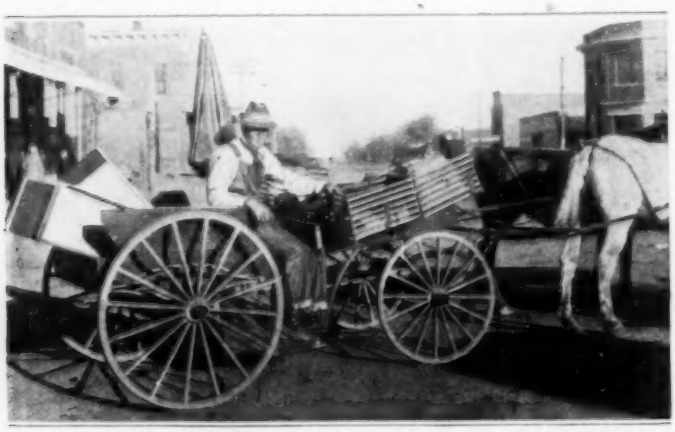
Wireless operators on shipboard in the vicinity of New England, and amateur operators in various parts of New England, have had the interesting experience recently of hearing musical selections come in through their receivers. This music has come from the apparatus of a student at the Massachusetts Institute of Technology who has been experimenting with wireless telephony. In its essential features his equipment doubtless is not unlike the apparatus used in various long-distance talking experiments which have been made with wireless telephones and which have been described in Popular Mechanics Magazine from time to time. In this case the telephone apparatus has been supplemented by a phonograph to which a megaphone is attached, the large end being placed against the musical instrument, and a metal band, connected with the electrical transmitting devices, extending across the smaller end of the horn. The selections which have been heard in various parts of New England and by astonished operators on vessels in New England waters have been played on this phonograph.



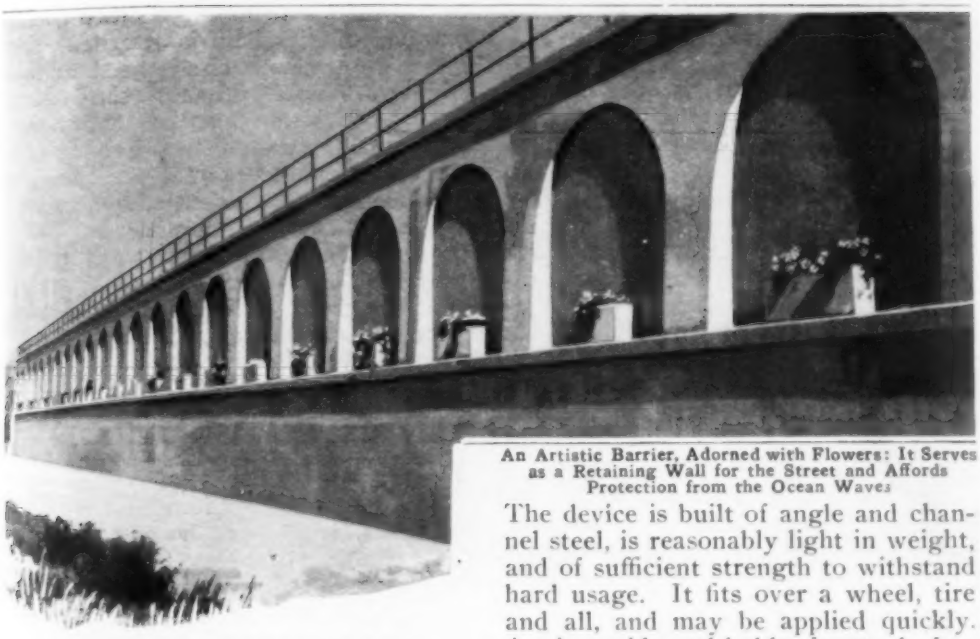
Phonograph Attached to Wireless Apparatus with Which a Student Transmitted Music to Various Parts of New England and to Ships at Sea

CONVENIENT DELIVERY CART SAVES DRIVER'S TIME

Believing that a great deal of time and energy is wasted climbing into and out of the ordinary delivery wagon, the box of which is several inches above the axles, a man who delivers groceries for several merchants in Stockton, Kan., uses a wagon which has a section cut out across the middle of its bed. A drop frame supports a platform below this opening and a few inches above the ground. A driver can get in and out of this cart much more easily and quickly than can one using an ordinary wagon. Where there are scores of deliveries daily this is an important feature. This cart has another advantage in that one can inspect his load and pick up the packages without stooping. The cart may be entered from either side.



A Delivery Wagon Which the Driver can Step into and Out of Easily



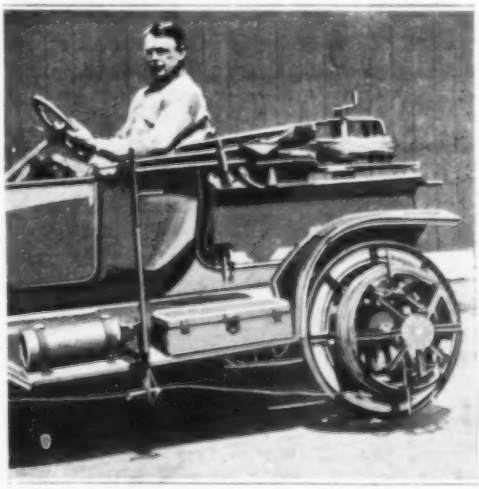
An Artistic Barrier, Adorned with Flowers: It Serves as a Retaining Wall for the Street and Affords Protection from the Ocean Waves

SEA WALL IS ADORNED WITH FLOWERS

An artistic concrete wall which extends along the ocean's edge for several blocks in a California town serves both as a protection against the sea and as a retaining wall for the street, which is several feet above the level of the water. The barrier is about 25 feet high; its face is marked by a series of symmetrical arches which relieve it of a barren aspect. An artistic touch has been given the wall by placing a flower box filled with flowers in each archway. These boxes are each 3 ft. long and have been given a stucco finish to match the surface of the wall.

WIRE REEL FITS ON WHEEL OF LINEMAN'S CAR

Adapted for use of linemen, a wire reel is being made which, when attached to one of the rear wheels of a motor car, allows a workman to do in an hour's time what ordinarily would occupy two men much longer. It is capable of reeling either bare or insulated wire into a neat, tight bale at the rate of about one mile in ten minutes. The device is built of angle and channel steel, is reasonably light in weight, and of sufficient strength to withstand hard usage. It fits over a wheel, tire and all, and may be applied quickly. A wire guide and holder is attached to the running board beside the driver's seat. By moving this back and forth an operator can distribute the wire across the reel evenly, and by gripping it can exert enough pull to keep it from running loose when the end approaches. By making a simple adjustment the appliance may be converted into a pay-out reel. When used in this capacity a spring prevents the wire from unwinding too freely.



This Reel can be Attached to a Car Quickly, and When in Place Does the Work of Several Men

SAVINGS BANK RESEMBLES SHRAPNEL SHELL

Taking advantage of the nation-wide agitation for preparedness, a manufacturer of advertising novelties has brought out a small savings bank which resembles a shrapnel shell. It stands 6 in. high, is 2 in. in diameter, and is made of polished metal. Near the point is a slot through which coins may be dropped. Across the center of the shell in large letters is the word "Preparedness." If desired, the name of the institution distributing these home banks can be stamped on an oval plate and fastened near the base of the article.

RAISE AND LOWER TRANSOM LIKE WINDOW SHADE

New features have been embodied in a combination transom adjuster and locking device lately patented by an Oregon inventor. Instead of employing the usual rod-and-lever arrangement, this attachment operates with a sprocket and chain. The cogged wheel, which has a strong spring inside, is mounted in a metal case secured at the top of the door jamb. At one side of this, screwed to the sash, is a small bracket to which one end of the chain is attached. To lower the transom, one jerks the chain slightly. This releases the spiral spring within the sprocket and causes it to push the sash outwardly. In this particular, as well as in others, the contrivance operates essentially the same as an ordinary window shade. The transom can be let down to any point, or raised, by paying out or drawing upon the chain. When closed the sash is locked automatically and can only be released by pulling the chain.

NEW METHOD OF UNHAIRING HIDES FOR TANNING

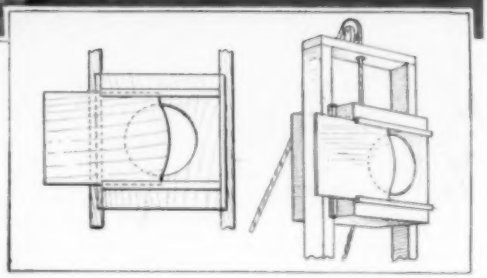
The prices of sodium and arsenic sulphides, which are largely used in the unhairing of hides, have attained an almost prohibitive level since the war began, and as a result various experiments have been made to find a substitute for these chemicals. The University of Leeds, England, reports that by boiling lime with sulphur and then adding soda in proper amounts the same effects can be produced as with sodium sulphide. The sulphur is added to the lime without slaking and, if necessary, boiled with the lime until all the sulphur is dissolved. This produces a yellowish liquid. The soda is added during or after slaking. In the case of a pack of hides for chrome sole leather, more soda was added to the lime; the hides were unhaired in four days. The preparation was also used for skins intended for vegetable-tanned dressing leathers with equally good results.

REALISTIC MOON IN FILM PRODUCTION OF "RAMONA"

A dramatic presentation of "Ramona" for motion-picture purposes, as produced recently by a California company, included a moonlight and other night scenes in which striking naturalness was secured in spite of the difficulties of getting the proper lighting effect. To present one of the scenes,

The Buildings in This Motion-Picture Scene Are Full-Sized Artificial Fronts. The Moon, as Shown at the Left, Consists of a Box in Which Lights are Concealed and in One Side of Which Is a Five-Foot Opening Covered with Muslin

a full-sized artificial front and side of Santa Barbara mission, and fronts of other buildings on a village street 200 yd. long, were erected. That a realistic moon might show in the background a framework, which was invisible at night, was constructed to hold a large box in which a 5-ft. round opening was cut and covered with muslin. Concealed in the box so that only reflected light shone through the muslin were two lights of 3,500 watts each. In another scene the moon was made to appear as a crescent by partly covering it with a slide. To show it setting behind the mission it was lowered on its frame as one lowers a window sash. The village street in these portrayals was lighted with 26 powerful lamps, eight illuminating the immediate foreground and the rest concealed behind the buildings. Three carbon, double-arc lamps, estimated to give 11,000 cp. each, were used. The lamps are devoid of mechanical vibration, are fitted with special reflectors, and are mounted on portable stands. To operate these lights it was necessary to install a transformer having a



2,200-volt primary coil and a 220-volt secondary coil.

SIMPLE TOOL FOR REMOVING AUTOMOBILE TIRES

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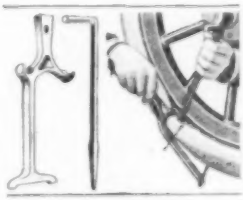

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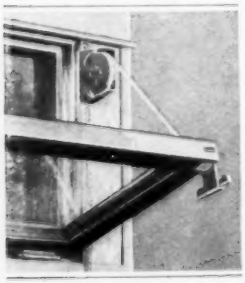

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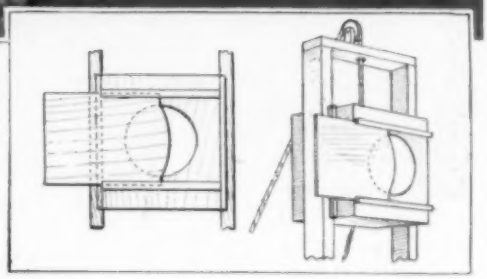

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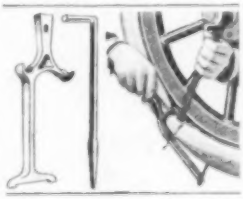


worked under the tire until it engages the rim. The handle is then inserted in its socket at the end of the tool and pressed over against the hub. By turning the wheel back and forth the lower end of the tool is made to strike the earth repeatedly, gradually forcing the tire off. To replace the tire it is deflated and partly put on by hand. Then the small hook on the tool is inserted to engage the wheel rim. By turning the wheel back and forth as before, the tire is gradually forced into position.

LAUNCH REPAIRED IN WATER BY NOVEL METHOD

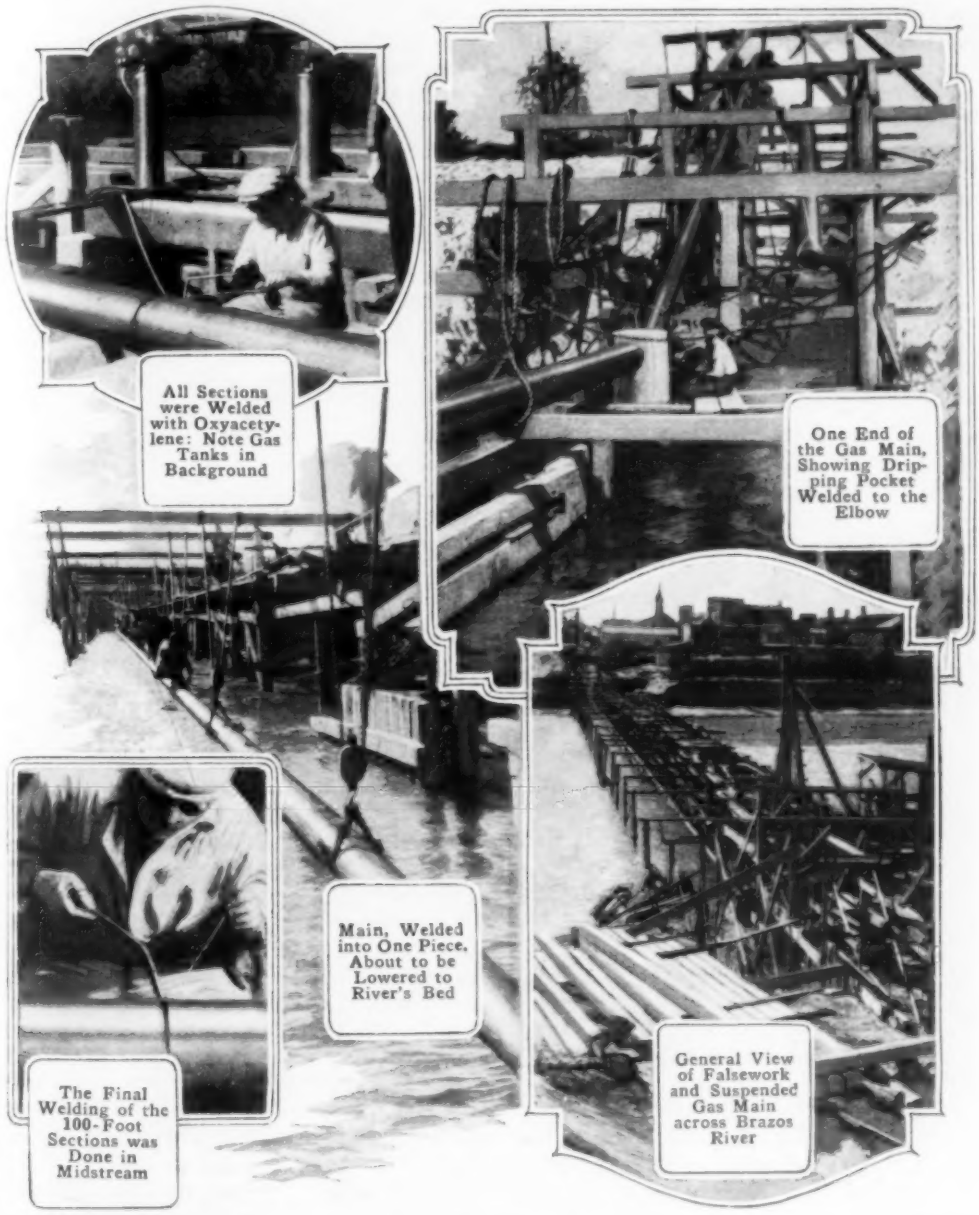
Unusual methods were employed recently in making repairs on a launch which was damaged by striking an old submerged pile while backing out of a small stream, towing a dredge. The rudder was bent and also the propeller protector. Ropes were slung about the stern of the boat and the rear end hoisted out of the water by the dredge. Since the delayed party had only two hours to spare, a forge was put right under the launch, the bent parts heated and straightened, and in a short time all were under way once more.

To Straighten a Bent Rudder and Propeller Protector, a Dredge was Used to Hold the Stern of This Launch Out of the Water While a Forge was Employed in Straightening the Disabled Parts

WATER-LEVEL RAIL ROUTE ACROSS WYOMING

An interesting piece of railroad construction has recently been completed on the Burlington system between Guernsey and Wendover, Wyo., where a nine-mile connecting link has been built between two lines, and a practically water-level artery established from Northport, Neb., to Billings, Mont. The company's main line runs east of this from Lincoln to Billings, extending through Wyoming at a much higher elevation. It is the intention eventually to extend the former road to Kearney, Neb., and in this way provide a low-level system between Billings and the Missouri River which can be used for heavy-load traffic at a material saving in operating costs. The Guernsey-Wendover link cost approximately $1,500,000 to construct, or about $31.50 a foot. The reason for this rather high cost is that mountains are encountered between the two points and in order to make the connection and escape heavy grades expensive construction was necessitated. Three tunnels and many cuts were made. This strip of road is being employed chiefly for freight handling. It gives a direct route into southwestern Nebraska from central Wyoming.

BIG MAINS LAID BENEATH TREACHEROUS RIVER


All Sections were Welded with Oxyacetylene: Note Gas Tanks in Background
One End of the Gas Main, Showing Dripping Pocket Welded to the Elbow
Main, Welded into One Piece, About to be Lowered to River's Bed
The Final Welding of the 100-Foot Sections was Done in Midstream
General View of Falsework and Suspended Gas Main across Brazos River

In spite of many unusual difficulties two 10-in. gas mains, each 550 ft. long, were successfully laid beneath the Brazos River at Waco, Tex., recently. These mains were composed of 20-ft. sections which were welded together by using oxyacetylene gas. Because much quicksand was found in the bed of the river it was necessary to dig a trench 12 ft. deep across the bottom of the stream to allow the pipes to rest on stable gravel. To accomplish this, falsework was built on which a combined derrick and pile driver could

move back and forth, and piles were driven on the upstream face of the ditch. Owing to the fact that the river is liable to rise suddenly, the 20-ft. sections were welded into 100-ft. sections on shore. The final welding was then done quickly before the mains were lowered into the ditch. The pipes were ⅜ in. thick and the ends, not being beveled, were set ⅜ in. apart to be welded. At either end of the long stretch of mains, drip pockets, made on the spot with the aid of oxyacetylene, were welded on. When the first main was completed it was found that it floated on the water and 115 weights were tied to each 20-ft. section to sink it.

FLY HARVESTER IS DEVISED FOR FARM PURPOSES

For use in truck gardens, where the black fly and other insects injurious to vegetation occasionally abound, a mobile trap of a novel type has been

By Using the Mobile Fly Catcher the Yield of This Bean Field has been Doubled

constructed. It is mounted on a low wheeled chassis, and when in operation straddles a row of plants and is pushed along like a perambulator. At its top are three cylinders to which the insects gain entrance through a longitudinal slit in the bottom of each. Converging glass leaves direct the flies to these openings in their upward flight. The lower portion of the machine is darkened with curtains, and since light is admitted through the plates, the insects naturally go in the proper direction. Two spring fingers, mounted horizontally at the front of the machine, strike the plants lightly and cause the flies to dart from beneath the leaves. The black fly is particularly injurious to beans, and the machine is therefore especially useful where this crop is grown. It can be employed at different stages in the plants' growth.

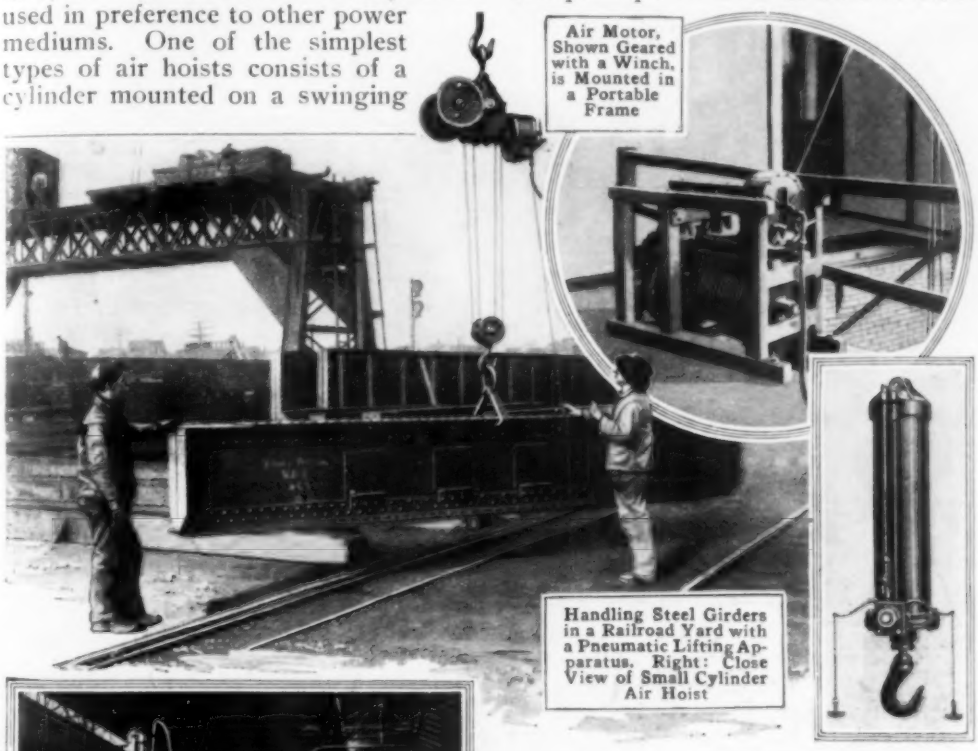
MANUFACTURERS AS WELL AS BOYS BUY MANY MARBLES

Many millions of marbles are made annually in the United States. It is estimated that the boys of this country use no less than 200,000,000 each year. But there are other users of marbles besides youthful players. The Standard Oil Company is one of the largest buyers of marbles; some of its purchases are used in oilcans, and others of larger sizes are rolled through graded pipe lines to clean out the paraffin that gathers on the inside of the pipes. The manufacturers of ink, chemicals, and powder use marbles. Other buyers of these little spheres are dealers in railway supplies, puzzle-box makers, and salt producers.

LIFTING HEAVY WEIGHTS WITH COMPRESSED AIR

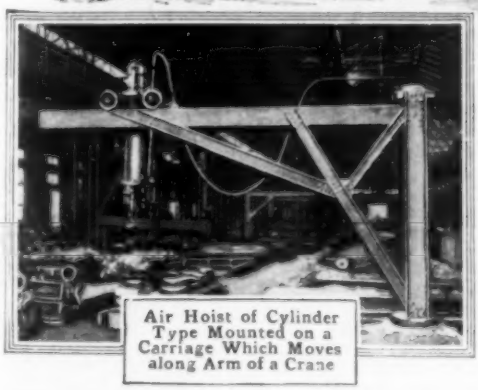
Particularly in factories where the fire hazard is great and painstaking precautions must be observed to prevent the generation of sparks, as in powder works, ammunition plants, and textile mills, heavy lifting is customa-

rily accomplished with compressed-air apparatus. In some other instances also, for one reason or another, air is used in preference to other power mediums. One of the simplest types of air hoists consists of a cylinder mounted on a swinging crane and provided with a piston and hook that may be raised or lowered by admitting and releasing air. While efficient, this machine is only suitable for use in places where every lift is of uniform height. Its valves are regulated by two chains, one for hoisting and the other for lowering weights. Another type is entirely different from this arrangement. It has a compact air motor geared to a winch and does its lifting by means of cables. With this device the speed and height of hoisting can be accurately controlled. The principle is used in both stationary and portable apparatus of different types.



Air Motor, Shown Geared with a Winch, is Mounted in a Portable Frame

Handling Steel Girders in a Railroad Yard with a Pneumatic Lifting Apparatus. Right: Close View of Small Cylinder Air Hoist

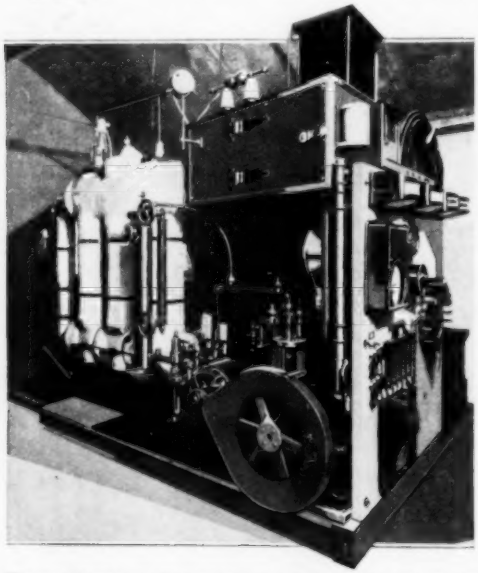


Air Hoist of Cylinder Type Mounted on a Carriage Which Moves along Arm of a Crane

CLAIMS TO MAKE GASOLINE FROM KEROSENE AND GAS

An electrical engineer residing in Kansas City has constructed an electrochemical apparatus with which he claims he can produce gasoline at a small fraction of its present cost. The process as outlined by the inventor consists in pumping both kerosene and natural gas into a still continuously. The oil is vaporized by heat and mixed with gas and then passes through a treating chamber on the way to a condenser. The mixture is treated with a high-frequency current, and the oil vapors are broken up and united with the gas vapors. The originator of the process points out that both kerosene and natural gas are hydrocarbons, as is

also gasoline, and it is his contention that his treatment unites the light with the heavy vapors in the right proportion and condenses the same, producing gasoline. Not more than 5 kw. of



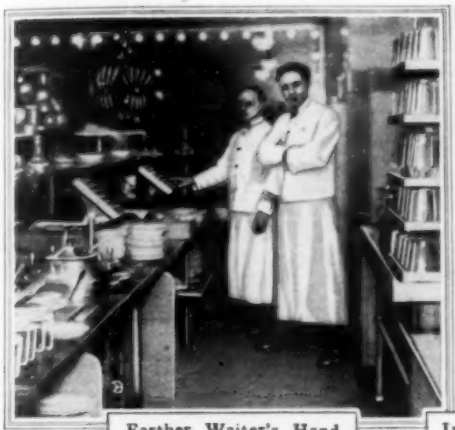
Electrochemical Apparatus by Which an Engineer Claims He can Make Cheap Gasoline from Kerosene and Natural Gas

electricity are required to convert 10,000 gal. of heavier oil into gasoline in a day, and less than a cubic foot of gas is needed for each gallon of the final product. As yet the inventor claims to have succeeded only in converting kerosene into gasoline, but he believes that in time he can accomplish the same result with crude oil.

NEW MOTOR-DRIVEN FLUSHER AND SPRINKLER IN USE

Combination motor-propelled street-sprinkling and flushing apparatus of a somewhat distinctive type has been built by a western truck company for use in Los Angeles. A battery of five machines is being used to cover the city. In general appearance the unit is not materially different from others in common service. The flushing nozzles, however, of which there are five, each separately adjustable, are mounted at the front of the chassis. Each is controlled by an individual valve, and all of them by a master valve operated from the driver's seat. While traveling at a speed of about eight miles an hour, the apparatus is capable of flushing a 60-ft. pavement. The sprinkling nozzles are provided at the rear, and at a speed of 10 miles, a street, 80 ft. in width, can be sprayed from curb to curb. The tank has a capacity of 1,200 gal. and can be filled in about two minutes. A pump mounted on the chassis delivers the water to the nozzles at high pressure.

Flushing a 60-Foot Los Angeles Street from Curb to Curb during the Official Tests of the Machine. Upper View Shows Arrangement of the Flushing Nozzles Mounted at the Front of the Chassis



Farther Waiter's Hand is on Electric Signaling Board by Which Orders are Transmitted to the Kitchen

Indicator in the Kitchen: Glowing Bulbs Show "Live" Orders; Numerals Show Number of Each Order to be Filled

The truck's propulsion shaft passes through that driving the pump, for which there is a special clutch and two-speed transmission set, so that both narrow and wide pavements can be cared for properly. At night the machines are used for flushing the streets and in the daytime for spraying them.

ORDER INDICATOR FOR RESTAURANTS

The distracting noises of shouted orders which make many quick-lunch restaurants places of so much confusion are entirely eliminated by the use of an electrical indicator which is being installed in eating places of the quick-lunch type, and also in hotels and high-class restaurants. It consists in any number of sending stations, located as desired within convenient reach of the waiters, and a receiving station installed in the kitchen. Each of these stations consists of a rectangular case of metal having any desired number of panels on the front side, from 16 to 100. Each panel on a sending station is fitted with a push button, above which is a slit in which the name of any dish, or article of food, may be inserted. To order a dish from the kitchen it is only necessary to press the proper button. This causes a red light to glow in the lower left-hand corner of a correspondingly labeled panel of the receiving station; it also increases by one a number in the center of the panel so that the chef can tell by glancing at the glowing lights and the numbers the orders that remain to be filled. As fast as they are filled a button by the proper red light is pushed. This reduces by one the number in the panel and when all of any particular order have been attended to the red light ceases to glow. The whole arrangement tends to eliminate confusion and promote accuracy.

CHEAP FLUID MAKES CLOTH NONINFLAMMABLE

An Iowa druggist, in conjunction with two professors connected with the pharmacy laboratories of the University of Iowa, is said to have discovered a fireproofing compound which will render wood, cloth, and other materials noninflammable; the cost of this preparation, it is declared, will be low enough to make practical its use commercially. Thus far the discoverer

Mississippi Normal College at Hattiesburg, Mississippi, as It will Appear When All of Its Buildings have Follows: A, College Hall Containing Class Rooms; B, Men's Dormitory; C and D, Women's Dormitories; Erected as the State Appropriations Permit are Marked with Figures: 1, Administration Building; 2, Hospital; 12, Athletic Field; 13, Tennis Courts; 14, Swimming Pool; 15 to 27,

and his associates have kept the formula of their compound secret. The new preparation is a transparent fluid, slightly aromatic. A piece of cheesecloth soaked in this liquid and then allowed to dry was drenched in benzine and set afire; the benzine burned off quickly but the cloth was only charred. A piece of wood after treatment with the preparation was held over a Bunsen burner for an hour, and at the end of that time showed a charred spot but no sign of flame. A patent protecting the compound is being sought.

¶ According to an official report, there were 5,073 wireless stations in this country in 1915, an increase of 1,139 since 1914.

SOUTHERN SCHOOL GROWING ACCORDING TO GREAT PLAN

One of the younger schools in the South, which is already attracting much attention because of its rapid growth and which promises to be one of the leading educational institutions in the southern Mississippi Valley, is the Mississippi Normal College, located at Hattiesburg, Miss. It is the only normal school in the state. The college is now completing its fourth session; on a tract of 200 acres have already been built a college hall, a men's dormitory, two women's dormitories, an industrial cottage, two residences, and a power house. The plant is valued at $500,000. The larger buildings are of pressed brick with steel frames and concrete

been Erected. The Present Plant is Valued at $500,000; Existing Buildings are Indicated by Letters as E, Vice-President's Home; F, Industrial Cottage; G, President's Home; H, Power House. Buildings to be 3, 5, and 28, Academic Buildings; 4, Music and Art Building; 6, 7, 8, 10, and 11, Dormitories; 9, Dining Hall; Industrial Cottages; 29, Farmhouse; 30, Trolley Station; 31, Railway Station

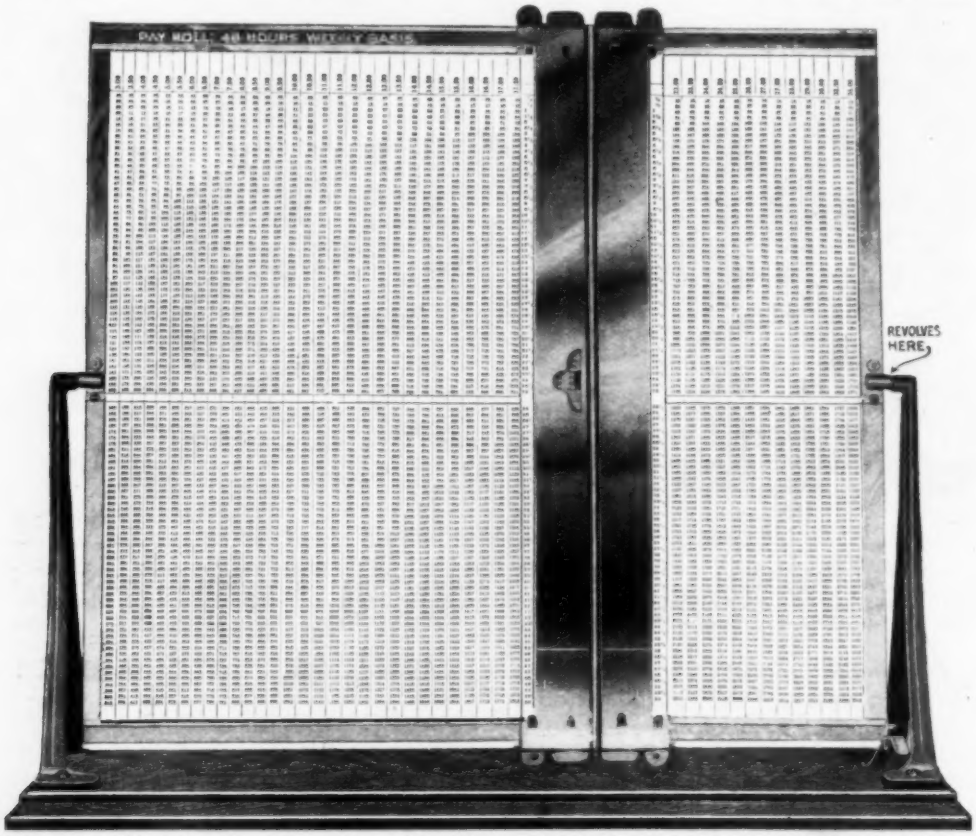
floors; in erecting them, a general plan has been followed which calls for the construction of over 30 additional structures, including a centrally located administration building, dormitories, a hospital, industrial cottages, etc. These will be added as the state appropriates funds.

Special stress is laid on such branches of study as agriculture, stock raising, manual training, domestic science, sanitation, hygiene, and the science of education. No student is given a certificate, or diploma, without having attained a certain standard in personal hygiene; sleeping with windows open and temperate habits are among the specified requirements in this line. The enrollment for the regular work was 800 for the past year.

RAPID CALCULATOR ASSISTS IN ROUTINE OFFICE WORK

To save the time and energy of an office force by simplifying the work connected with routine computations, such as are encountered in making out pay rolls and figuring rates, a helpful calculating system has been introduced. The same principle and form are embodied in a number of special devices, each adapted for some specific or correlated set of purposes. Thus, there are pay-roll calculators, which indicate at a glance any hourly or weekly rate for any amount of time from a fourth of an hour to 200 hours; paper calculators, capable of answering questions presented in handling stock of any size, weight, shape, quantity, or price; tax

calculators, and others for discounts, invoices, and similar functions. The device consists of a chart with figures arranged in columns on both of its surfaces. It is pivoted in a frame so that it may be turned from one side to another expeditiously. A movable gauge, or slide, which is graduated into divisions of time, extends perpendicularly across the face of the chart.



Frequently a Workman Engaged at Different Jobs during a Day Receives a Certain Rate of Pay One Hour and an Entirely Different One the Next. The Calculator Simplifies the Labor of the Person Who Makes Out Long, Complicated Pay Rolls

Should one wish to know the amount of money due an employe who has worked 45½ hours and regularly receives $23 for 48 hours' labor, the slide is first moved to the column headed "23.00". Then by glancing opposite the graduation marked "45½" on the gauge, $21.80 is found, without any mental effort, to be the sum. In more complicated computations the operation is no more difficult.

WAR INCREASES DEMAND FOR WASTE PAPER

Because of increased prices, waste paper has become a source of considerable revenue not alone for housewives but for commercial concerns also. A shortage of raw paper materials has been occasioned throughout the country because of the war; England and Norway have forbidden the exportation of linen and cotton rags, and raw materials in this country have been diverted to new channels. Consequently the paper makers have been hard pressed to supply their trade. It is estimated that 15,000 tons of different kinds of paper and paper board are manufactured in this country daily; much of this, after it has served its purpose, might be again made up into

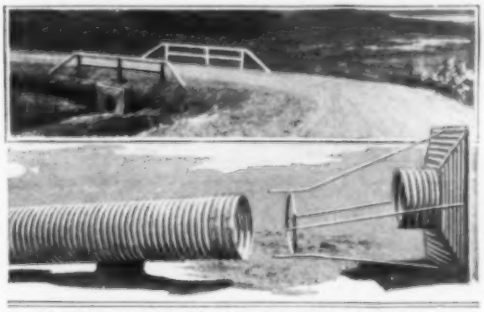
new stock of some grade. To secure a larger percentage of this discarded paper, buyers have advertised in the daily press offering one, and one and a fourth cents per pound for book and magazine paper. Concerns which formerly burned their old correspondence are now selling it; one large firm has about 500 tons of such material to dispose of each year. Also, the Department of Commerce has issued a bulletin telling how to select, assort and dispose of waste paper, rags, and other paper-making material.

A concerted campaign for the conservation of paper is being made among many large corporations of the country. Firms sharing in this effort are using short letterheads wherever the correspondence will permit; a decided reduction is being made in the number of circulars sent out and house publications are being limited as to size.

An effort is being made to induce paper manufacturers to use more American clay in preference to foreign clays, which are regarded by many as preferable because they are said to be whiter. American clay-mining companies have agreed to furnish the Bureau of Standards with samples with which exhaustive tests of their products can be made to determine their fitness for various uses.

BUILD METAL CULVERT HEAD TO PREVENT WASHOUTS

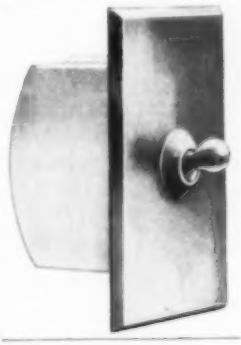
Corrugated-iron culvert heads are being used to some extent in Alberta to prevent flood water from cutting through dirt roadbeds on rural highways in new districts. The device is simple in construction, easy to install, and adaptable to conduits of different types, although it is especially employed with those made of metal. Its four sides are set at a sufficient angle to lead water into a pipe and protect the walls of an embankment from serious erosion, during an ordinary rainstorm at least. It is built with a collar of liberal length and a series of bracing rods which terminate in a ring that is intended to be made fast about the circumference of the conduit to which the head is applied. There is little difficulty encountered in fitting it to existing pipes, while it has the additional advantage of being much less expensive than stone or concrete.



Inexpensive Culvert Head Which Retains an Embankment and Prevents Washouts

ELECTRIC TOGGLE SWITCHES GAIN FAVOR HERE

An adaptation of the toggle electric switch, which for some years has been used in Europe, is now being made in this country and is regarded as preferable to the less artistic switch common in America. The new toggle switch is easy to operate and inconspicuous. The visible portion consists of a small metal lever fitted into a rectangular, oval, or round metal plate, having no screw holes. To turn lights on or off, the lever is moved up or down through an arc of 90°. The mechanism consists of two levers, the first being moved by the toggle handle. Between it and the second lever, which holds the contact blades, a compression spring is interposed. These switches have been made to comply with the American underwriters' rules by furnishing them with a quick make-and-break movement.



PAVED FORDING PLACE IN CITY STREET

A paved fording place is one of the interesting features of a street in San Antonio, Tex. Concrete was the material used at the crossing. For a greater part of the year the course of this stream is dry, but in the wet season the water is about one foot deep at the ford. The construction of a crossing of this sort is much less expensive than any sort of a culvert, and fords of this character are not uncommon in the Southwest in stream beds which are dry a large part of the time. In case one prefers not to drive through the water at this ford, he can cross the stream by going out of his way a few hundred feet and using a street under which the water flows through a culvert.

COURTESY OF ENGINEERING NEWS

A Paved Fording Place in a Street in San Antonio, Texas

ST. LOUIS TO RETAIN BIG OUTDOOR THEATER

The great outdoor auditorium constructed in Forest Park, St. Louis, in connection with that city's special celebration of the Shakespeare tercentenary, is to become a permanent feature of the park, according to the announcement of those in charge. The stage used for these performances measures 150 ft. across the front and 60 ft. at the back. It is set in the midst of full-grown trees, some of which grew in their present location, others being transplanted. In front of the stage is a wide dancing green. Both it and the stage are partly inclosed with vines and shrubs. The lighting system was concealed in the trees. On a sloping hillside overlooking the stage were temporary seats for approximately 10,000 persons; at the front were 546 box seats; back of these were grandstand chairs, and rising above the chairs were bleachers. A stream runs across the area back of the stage. It was bridged at three places for the benefit of the actors, whose dressing tents were near by, and for the spectators. The seats and tents were removed after the celebration.

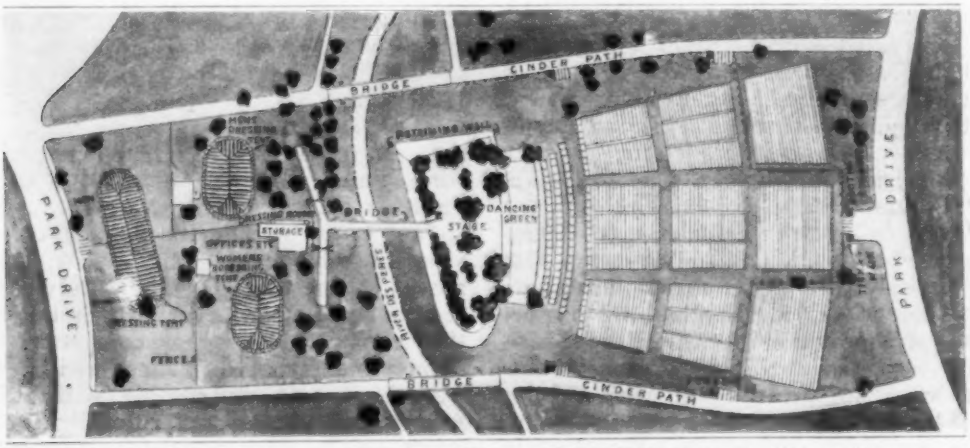
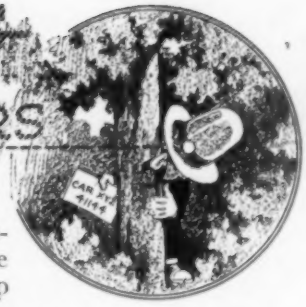


Diagram of the Permanent Outdoor Auditorium in Forest Park, St. Louis, Which will Accommodate 10,000 Spectators

TRACING RUNAWAY RAILWAY CARS

by George E. Walsh



At times when the scarcity of freight cars causes the railroads to place an embargo upon certain classes of goods, the problem of keeping track of its cars to see that they do not run away and become wanderers upon the face of the earth is a stupendous one for each company. Before the National Association of Car Accountants was formed and there was no close traffic arrangement between the various railroad systems respecting the control of freight cars, it was a common thing for some erratic unit to travel ten or fifteen thousand miles before it returned to its starting point. There is the record of one runaway car that was away from home for nearly two years, and in that time it traveled a trifle over 20,000 miles, visiting nearly all the principal cities of the United States, and passing through all kinds of weather and climate.

In all that time a car tracer from the company which owned it was on its track, but it eluded him constantly until it was finally run down and sent back home from a remote region in Texas. When it left the home sheds it was a bright new car; when it returned it was battered and old, so travel-stained that its own maker could hardly recognize it. It holds the prize record for truancy among freight cars.

Traffic conditions have been greatly improved since those days, and railway companies detaining a car belonging to another company are penalized by a fine. The agreement is that when a car is received from another railroad it shall be immediately unloaded and returned to its owner. But in times of a general car famine not all of the railroads obey this rule. Because there is more profit in using the car, even though a daily fine is exacted for its unlawful detention, some railways keep it for weeks, or even months, for its own traffic, returning it only after the congestion has lessened. The small connecting railroads are often the greatest offenders in this respect in times such as the present, when traffic congestion is more than usually abnormal.

When a freight car is built, it is given a number before it leaves the shop, and thereafter it is always known by that number until it is worn out and scrapped. When a new car receives its number, and starts out upon its business career, it is entered in the record book, and a careful account of its wanderings and earning powers are kept there. This record book is a history of the car, and by consulting it, one can learn how many trips it has made, what cities it has visited, how many times it has been to the repair shop, and also where it is supposed to be at any given time.

But in spite of all this care in keeping a record of each car, now and then, for some unexplained reason, one disappears from sight—literally running away. Some of the big companies employ car tracers, but as a rule a printed tracer is first sent after the car to bring it back home. This printed tracer, in a blue envelope, is sent to the person in whose jurisdiction the car was last supposed to be, and if it has passed out of his district the tracer is sent on to the next one to whom the car was consigned. This little printed tracer failing to bring the car home in a reasonable length of time, a man known as a tracer is sent after it. The tracer is really a railroad-car detective.

And sometimes it is more difficult to track a runaway freight car than a criminal. There are tens of thousands of miles of railways, and hundreds of

thousands of freight cars, and to find one carrying a certain number is often like hunting for the needle in the haystack. The tracer may arrive in a city, where the runaway is supposed to be, at the very moment when the car is leaving it in the opposite direction. It may cross his track on a parallel line, or dodge around him on a short line. It may be headed south while he is traveling north, or rolling merrily toward the Pacific while he is going toward the Atlantic.

A runaway car apparently is as depraved as any criminal. It hides on a lonely siding, or gets lost in a short swamp line. One such runaway rested nearly a year on a siding in southern Texas simply because it got lost, and no one seemed to know just what to do with it. The nearest freight agent had no record of it, and no tracer had requested its return. Going on the principle that what is "everybody's business is nobody's business," this local agent made no effort to hunt up the owners. If the order had been received by him to return it, he would have obeyed, but lacking such orders he left it on the siding. In the course of time, it was occupied by a family of squatters, who lived quite comfortably in it for six months, and were routed out only when, quite by accident, the car tracer discovered it.

The runaway cars are generally empties. Having discharged its cargo at a certain point, an empty, with no cargo for the return trip, is very apt to be overlooked. There is no great care exercised over it, because there is no freight involved. Very likely the railroad company, anxious to return the car loaded, holds it a day or two for return freight, and when this does not turn up, its presence on the siding is forgotten.

The life of a freight car may be from five to ten, or more, years, depending upon the kind and amount of freight it carries. Box cars go to the repair shops oftener than the flat ones, for the simple reason that the doors and sidings of these are apt to get smashed by rough usage. But while one freight car may be worn out in a few years through the exigency of travel, another will travel merrily back and forth across the country for 15 years, escaping as if by some miracle all heavy and damaging loads.

A car that left Minneapolis loaded with flour for New York was unloaded in the usual way, and sent back with machinery to Albany, after which it was supposed to be reloaded for the continuation of its trip to its starting point. Instead of that it got astray somewhere between Albany and Buffalo, and started south. It got as far as Binghamton, and then took a notion to visit Florida. Once down there among the orange groves it decided to stay. Years later the owners found it on an abandoned siding being used as a bungalow for a family of "crackers." The attempt to evict the family resulted in a row, and court proceedings had to be resorted to. When the car tracer came into possession of his company's property, he found that the abandoned siding was no longer connected with the main track, and to get his car away he would have to lay a mile of new track. After much correspondence with the railroad, he offered the car to the family that had been evicted for a nominal sum, but the indignant cracker refused to pay a cent for it. The tracer finally left it on the abandoned siding, and the family of squatters took possession again. According to last accounts they were still living in it free of rent.

It does not always follow that a runaway car does not earn its keep. The roads charge one another a certain mile percentage for the use of freight cars, a small amount for common box and flat cars, and a higher percentage for refrigerator cars. This fraction of a cent per mile per car does not seem to amount to much, but when you count over a million freight cars and the billions of miles they travel in the course of a year, the total runs into big figures. A runaway car may be traced, and yet not actually captured for six months or a year. The tracer, however, knows how many miles it has

traveled over the lines of a given road to reach certain points, and he can compute the charges for its use. Thus one car that had been a runaway for over a year had earned over a thousand dollars for its company, although it had not traveled over its lines once.

The empty car is the bugaboo of every company. That means a dead loss of the mileage charges run up against it. The great problem of the railroads is, therefore, to see that every car is returned to its owner loaded. That means profits. In order to keep the cars loaded, the companies will sometimes resort to all sorts of tricks. The old favorite one was to hold an empty on a siding indefinitely until it could get a return cargo. No mileage charges could be made against it when resting idly on the side track. This led to so many abuses that the present method of fines was adopted by the railroad companies. Besides the mileage charge, a substantial fine is made against a railroad which detains a car belonging to another road beyond the agreed time for unloading and reloading for the return trip. These fines are imposed only where the abuse of the privilege of exchange is glaring and willful.

"The tracer may arrive in a city, where the runaway is supposed to be, at the very moment the car is leaving it in the opposite direction."

A small branch railroad that did a good freight business of a local nature, but was weak on its passenger traffic, took advantage of a rather loose traffic agreement then in operation by depending almost entirely upon borrowed cars. It didn't build a freight car for ten years, and at the time of the exposure of the trick it had only a dozen old battered freights of its own. Its method was to order goods, and then take possession of the cars they were shipped in. It became the graveyard of lost or runaway cars. One that came into its possession was

"Years later the owners found it on an abandoned siding, being used as a bungalow by a family of 'crackers.' The attempt to evict the family resulted in a row."

never returned until the company owning it made such peremptory demands that it had to give up the property. By a shrewd system of holding the cars of the different lines for a month or two, it managed to carry on its local traffic at the expense of others. Its system was finally exposed, and for years after that its business was nearly paralyzed by the refusal of the other railroads to send cars, even when loaded with legitimate goods, over that line.

An average freight car costs about $750, but the refrigerator and special cars built for carrying perishable goods may cost two or three times that amount. The average freight car weighs about 28,000 lb. and has a carrying capacity of 60,000 lb. of freight. The loss of a few hundred of these a day makes, therefore, a big difference in the profits of a single road. There has never been a time when the companies had enough freight cars to meet the heavy demands of trade in seasons of unusual prosperity, and though thousands of new cars are built every year, car famines occur every time the season's crops are ready to be moved. The number of freight cars that are scrapped each year almost keeps pace with the number of new ones built.

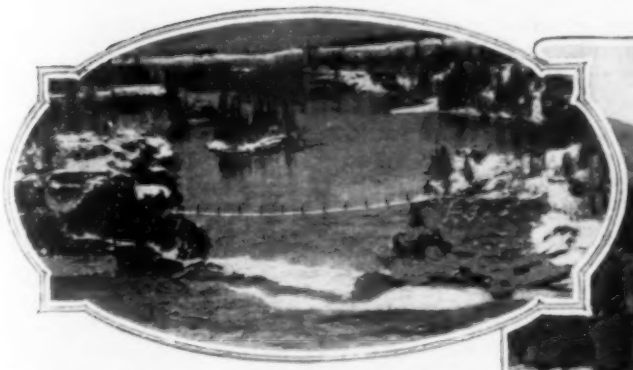
The scrapping of a freight car is one of the fine arts of efficient railroading. A car may go to the repair shop half a dozen times before it is ready for the scrap pile. Not until the trucks are practically worn out so they cannot be renewed has the railway wanderer passed beyond its life of usefulness. Even then every part of the ironwork is recovered, and such parts that are still useful go into other cars before they are finally scrapped. The wooden platform and the boxed-in sides are the first to be renewed, and then the coupling pins and mechanism, and finally the wheels. A freight car will frequently use up two sets of wheels before it is entirely worn out and ready for final demolition.

HANDY DIVING HOOD SAVES DRY-DOCKING

To make possible the repair of minor injuries to boat hulls without the necessity of dry-docking, a Florida man has devised a diving hood. This may be placed over the head of a good swimmer, and the man lowered over the side of the boat. Air is pumped down through a hose, and if too high a pressure is attained, the surplus escapes through holes in the hood's lower edge. Wearing a head covering of this sort, the diver can remain under water much longer than without. It is thus possible to make emergency repairs even though far from land and ordinary sources of help. The device has found particular application in tropical waters, where a full diving suit is excessively warm and cumbersome. Sometimes this type of headgear is used by the swimmers as an aid to under-water tussles with sharks, a sport in which some of the more daring delight.

SIMPLE SUSPENSION BRIDGE BUILT OVER FALLS

Spanning a gap of approximately 100 ft. between opposite banks over the Kananaskis Falls on the Bow River, near Banff in Alberta, Canada, is a narrow footbridge of the suspension type. Of itself the structure is not unusual, but the manner in which it was constructed is interesting. The men who accomplished the work were without boats, and a six-mile detour from the point was then necessary if one were to cross the stream, which is very turbulent above, and wide below, the falls. A line was finally extended from one bank to the other, however, by going well upstream and attaching it to a



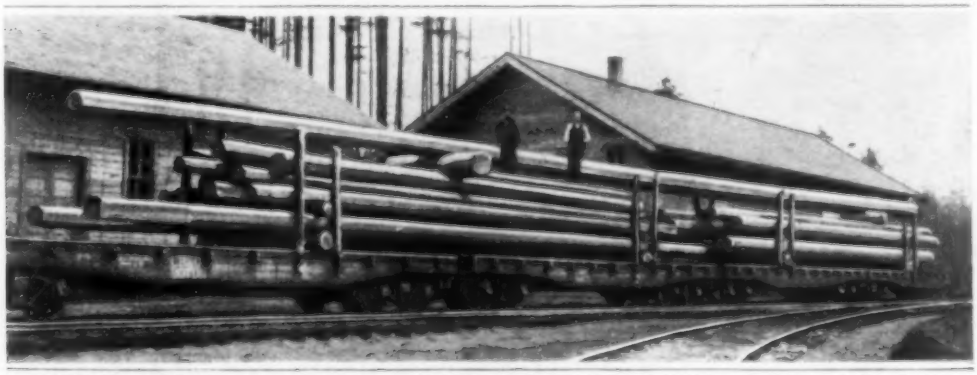
The Suspension Bridge Extends between Two Rocky Points Immediately over the Falls

float which, with some difficulty, was worked across the water. With this reaching between the two points it was comparatively an easy matter to get the cables across. Three-quarter-inch steel ropes were used for the floor chords, and ⅝-in. material for the side members. Each was securely anchored in the rocks, and the upper ones were passed over steel uprights. One-by-six-inch boards were used as crossties and fastened at intervals of about two feet by means of clamps. Long ties were placed some six feet apart to hold the uprights and their braces, which were clamped to the upper cables. The floor planks were laid longitudinally and spaced an inch or more apart so as to be flexible enough to withstand the twisting, swinging movement of the structure. Finally cables were extended from the middle of the bridge to the rocks in order to brace it against the wind.

Close View of the Structure, Showing the Details of Its Construction

GREAT FIR SPAR SHIPPED ACROSS CONTINENT

There was recently shipped across country from Tacoma, Wash., to Brooklyn a fir spar, 165 ft. long. The huge timber extended over four freight cars and was cautiously hauled on slow schedule throughout its long journey. In the West it was roughly hewn into



A Fir Spar, 165 Feet Long, Which Required Four Flat Cars to Carry It from Tacoma to Brooklyn

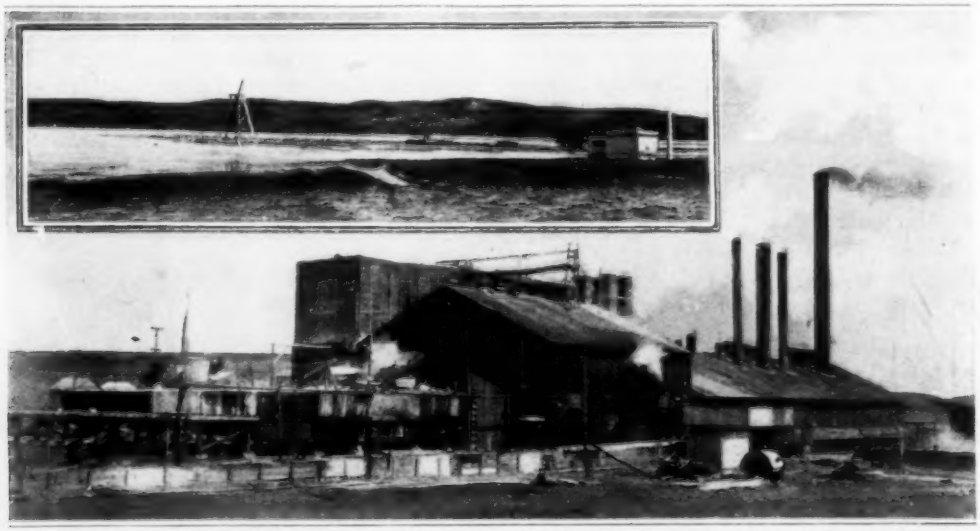
octagonal form; in Brooklyn it was smoothed off, oiled, and painted, preparatory to being erected on the lawn of a country home as a flagstaff. The tree from which it was cut was 300 ft. high and was estimated to be 500 years old. The big timber contains enough lumber to make the frame of a fair-sized dwelling.

MUCH POTASH BEING TAKEN FROM NEBRASKA LAKE

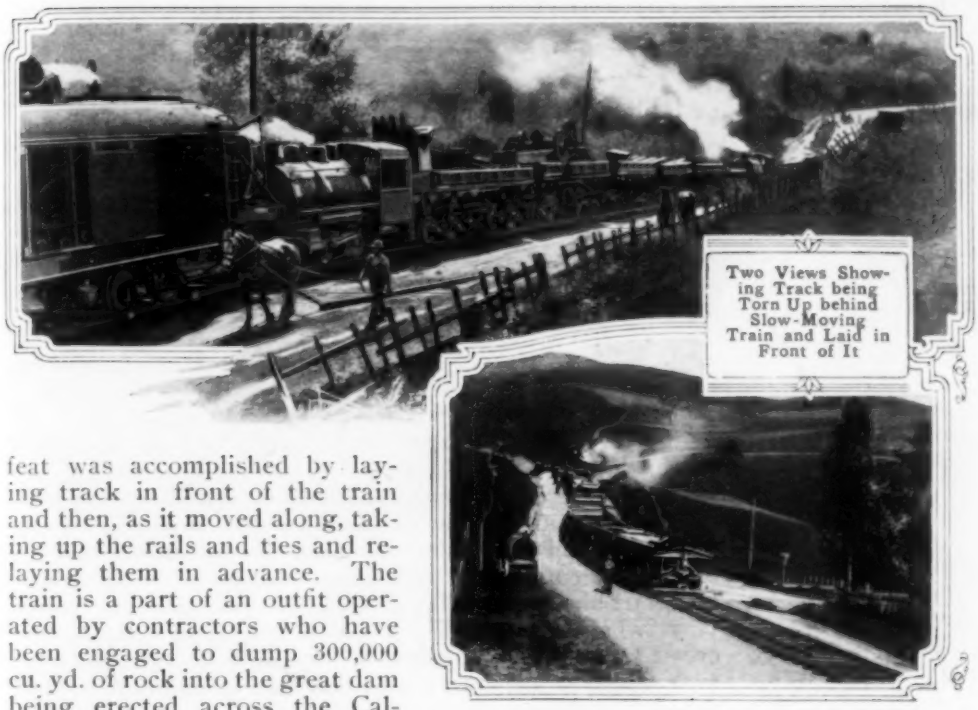
A source of potash which in the short time that it has been in the hands of promoters has already brought excellent returns, is Jesse Lake, one of many bodies of brackish water in northwestern Nebraska. This sand-hill region is one to which the geologists of the state have long pointed as a source of mineral deposits which only has needed patient development to make it immensely profitable. In 1912, after extensive investigation, two young men staked out the claim on Jesse Lake from which, partly as the result of the European war, they are making a fortune. One very serious problem which the promoters were confronted with was transportation. This they solved by erecting a pumping station on the shore of the lake, at its saltiest end, and laying two lines of pipe to the evaporating plant which they built three miles distant on the railway line. One of these pipes is 4 in. in diameter and the other 2½ in. The plant includes an evaporating tower, 100 ft. long and 24 ft. wide, in which the sun's heat accomplishes one-seventh of the evaporation. The brackish water then passes through four huge vacuum pans in which it is boiled down to a semiliquid state, containing about 45 per cent solid salt. Part of the product is sold in semiliquid state and is loaded into tank cars, about one carload being shipped daily. With part of the product the process is carried farther, and the salts are crystallized in vats and then run through a centrifugal drier. At present no effort is being made to separate the various salts.

RAILROAD TRAIN CRAWLS ALONG COUNTRY ROAD

A few weeks ago a train consisting of two engines, a steam shovel, and 12 dump cars left the main railroad line at Milpitas, Calif., and started at a snail's pace along a country road that leads to the site of a dam in the Calaveras Valley. This spectacular



The Plant Where the Water from Jesse Lake is Evaporated Until a Semiliquid or Crystallized Residue is Secured. Above: Jesse Lake and the Pumping Station Which Forces the Salty Water into Pipes That Lead to the Evaporating Plant Three Miles Distant



Two Views Showing Track being Torn Up behind Slow-Moving Train and Laid in Front of It

feat was accomplished by laying track in front of the train and then, as it moved along, taking up the rails and ties and relaying them in advance. The train is a part of an outfit operated by contractors who have been engaged to dump 300,000 cu. yd. of rock into the great dam being erected across the Calaveras Valley to impound water from the mountains higher up. The distance between Milpitas and the dam's site is 10 miles, and it was estimated that the journey would require a month. The reservoir will not be completed until 1918, it is said.

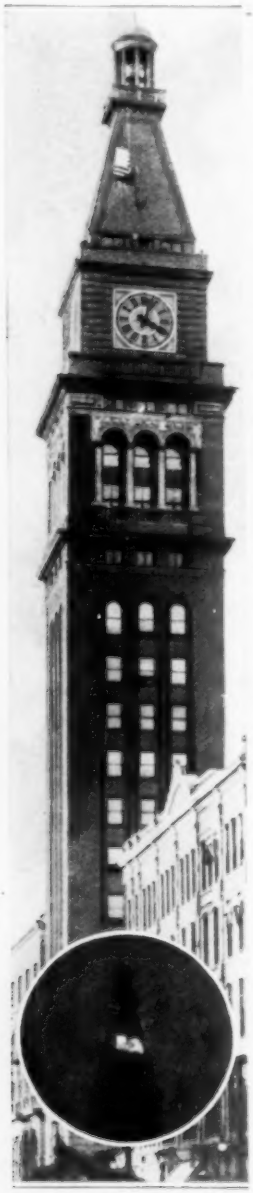
ELECTRIC DISHWASHER FOR HOUSEHOLD USE

An electric dishwasher which will do its work in three or four minutes is now being manufactured for household use. The dishes are placed on maple racks which prevent the n from touching one another, and are slid into a chamber. A switch is turned which starts a motor and scalding soapy water from a tank plays over the chamber's contents. The suds are under pressure created by a small pump operated by the motor; in this way the dishes are drenched again and again as two nozzles revo'/e at the rate of 30 revolutions per minute. The water and dirt drains off through the bottom of the chamber. By means of a window and an electric light one can see when the dishes are washed. They are then removed with their racks, and in a few minutes dry from their own heat. The machine is finished in white enamel. A stand may be secured with the washer to support it and hold the two different styles of racks for drying dishes.

Electrically Operated Machine for Household Use That Quickly Washes Dishes in Scalding Water and Dries Them

ELECTRIC FLAG ON HIGH DENVER TOWER

An electrical United States flag which doubtless holds the altitude record for this country's national emblems of that type of construction, has been erected on the tower of a Denver building and is 300 ft. above the street. At night it is visible from remote parts of the city and from some points 10 miles out in the country. The big display, which was erected as a feature of a campaign to inspire patriotism, measures 9 by 14 ft. and contains two hundred and fifty 10-watt tungsten lamps. By means of special electrical control a waving effect is produced. The altitude of Denver is authoritatively given as exactly one mile above sea level. Assuming that the street adjoining the tower is level with the point from which the altitude is calculated, this flag is 5,580 ft. above sea level. The flag was fastened to the tower's steep roof a section at a time, and the work was watched with intense interest by hundreds of spectators.

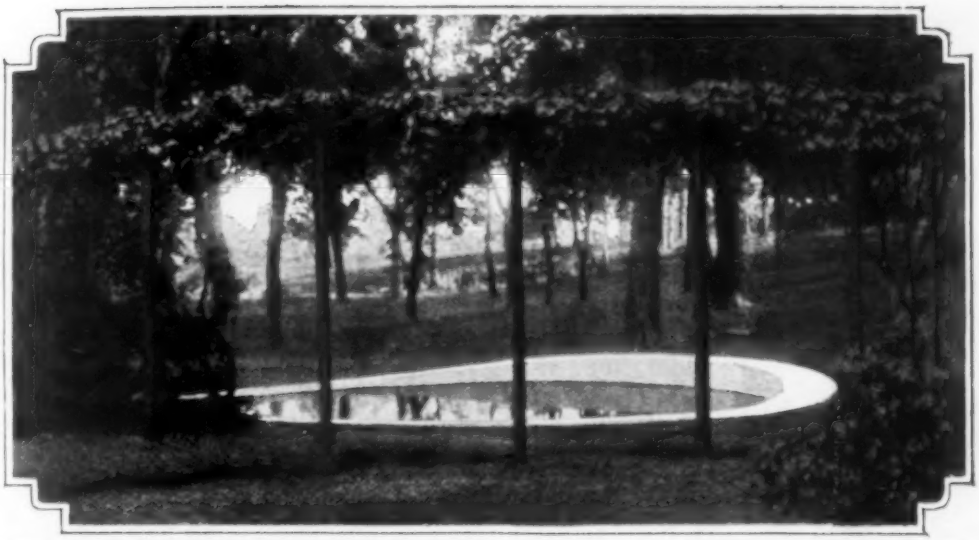


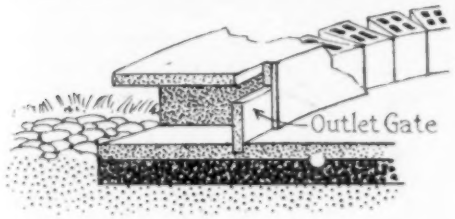
SEMAPHORES CONTROL SHIPS IN LIVINGSTONE CHANNEL

The United States Lighthouse Bureau has recently installed two semaphores to govern the movement of ships through the Livingstone channel, a waterway dug about three years ago a few miles south of Detroit for southbound ships and connecting with the natural channel of the Detroit River. The navigable waters in this region are of such a character that it has been deemed necessary to require not less than five minutes' time between ships passing through the new channel. Proper observance of this rule is obtained by the use of the semaphores, which are conspicuously placed. One of them is 8 ft. long and 10 in. wide. At night its position is shown by two lights, one on its swinging end and the other at the pivoting point. When the arm is held in a horizontal position it means that less than five minutes have elapsed since the next previous boat passed. A vessel observing the first semaphore in this position must reduce its speed, according to the new rules, until a full interval of five minutes between it and the preceding vessel has been gained. If the full interval has been secured by the time the boat reaches the second semaphore, the latter will show in a vertical position.

CONCRETE WADING POOL MADE WITHOUT FORMS

That it is possible to construct a concrete wading pool without the use of forms, thereby lessening the cost, particularly if the pool is very irregular in shape, has been demonstrated by a park superintendent in Fargo, N. D. After the excavating was finished and agricultural tile laid for draining, the floor was laid according to sidewalk specifications. While the aggregate was being poured, hollow building tiles were set on end in the concrete, around the pool's edge, to form the beginning of the wall; other courses were added according to the height of the wall. As



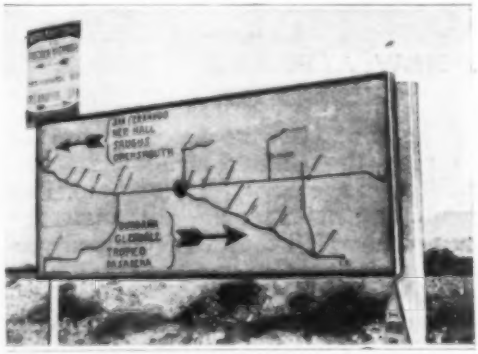


This Concrete Wading Pool was Constructed without the Use of Forms: The Wall is Shaped by Using Hollow Tile

the tiles were laid they were filled with concrete, which was also plastered into the spaces at the back. Then the front of the wall was finished off, the finishing coat being carried up over the top and connected with a walk which was laid around the edge of the pool.

ROADSIDE MAP SHOWS BEST MOTOR ROUTES

An example of an unusually effective method of marking highways is found in the sign erected by the Automobile Club of southern California near Roscoe, Calif. On a large signboard, such as is used for roadside advertising, a map has been painted outlining the good roads to various points within a radius of 17 miles from Roscoe. The location of all the towns is shown on these routes and in addition the principal neighboring communities are again named in two columns, beside each of which is an arrow, showing the direction in which the towns lie. A red disk marks the name Roscoe on the map, indicating that that is the village near which the sign is located. A smaller supplementary board, attached to the larger one, shows the direction and distance to the Lincoln Highway.



An Informing Roadside Map Erected by an Automobile Club near Roscoe, California

MOVIE CAMERA SHOWS RIFLE IN ACT OF DISCHARGING

The firing of one of the 12-in. disappearing guns that guard Ft. Warren, Mass., is shown by the accompanying illustration, which was reproduced from a motion-picture film. The exposure was made while the rifle was in use during recent maneuvers of the United States Coast Artillery. It records what occurred in exactly three-eighths of a second following the discharge of the shell. It will be observed in the last picture that the recoil of the gun is just beginning to be perceptible. At this point the shell is well on its way and the cloud of yellowish smoke is rolling out to sea. What appears to be pure white smoke in the third picture is in reality the red flash that follows the expulsion of the missile.

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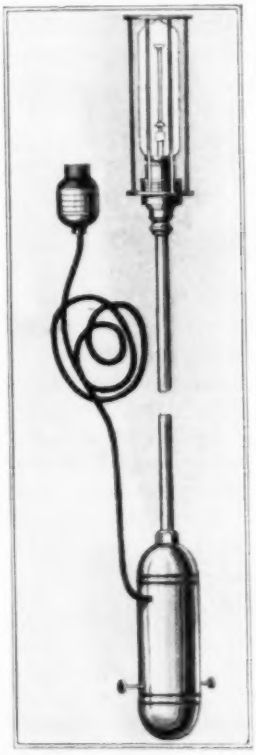
NEW ALPHABET USED BY CHINESE GRADUATES

The first class of students trained to read the Chinese language when written in the newly invented alphabet graduated this spring, although the school in which they were trained was opened only a few months ago. This alphabet was described in Popular Mechanics Magazine three years ago; it has 39 characters, which are designed on the Roman plan. Each student in the class was given a blank sheet of paper on which he wrote a number of questions, using the new alphabet; these were then answered by another student in another part of the hall. The minister of education in testing the class dictated a number of questions which the scholars answered satisfactorily. It is claimed that boys who have never been to school can be taught in four months to write with this alphabet.

INSPECTION LAMP DESIGNED FOR MUNITION WORKERS

To enable workmen in munition plants to examine the interior of shells during their construction, a British firm has brought out an electric lamp which is especially adapted for this function. Within a substantial guard made of brass wire is a tubular bulb, about an inch and a half in diameter and slightly less than five inches long. This is held in a socket secured to one end of a rod which at its opposite extremity is fitted with a wooden handle and supplied with a push-bar switch. A flexible cord is connected with the instrument through this grip, so that it is held out of the way and is of little interference to the user. When fitted with bulbs of different resistance the lamp can be connected with an ordinary lighting circuit, or supplied with current from a low-voltage accumulator or dry cells.



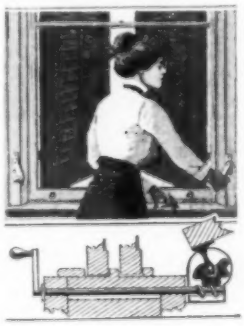
This Shows the Experimental Car in Operation: The Establishment of a Public System between Two California Towns has been Proposed, but as Yet has Not been Built

NOVEL AERIAL TROLLEY CAR BUILT IN CALIFORNIA

Encouraged by the popular demand for faster and better transportation facilities, a western inventor has developed an aerial-tramway system which it has been proposed to use in the construction of a rapid-transit line between Burbank and Glendale, Calif. In some particulars the scheme is similar to the monorail road for which the lower house of the Massachusetts state legislature voted $5,000,000 in 1914. It differs from the latter, however, in that the car is driven by an aerial propeller. At the present time the system is understood to be still in an experimental stage, although it is being promoted by a corporation. The model car has a streamline body, built largely of steel and aluminum, and accommodates more than 50 persons. It is supported above the ground on a single overhead rail. The experimental line is about 400 feet in length, and for some time has carried passengers, who have ridden in it for recreation and because of its novelty. The car as now built is equipped with a 24-hp. gasoline motor. For commercial purposes, however, it would be of greater power, entirely inclosed, and have a larger capacity. A speed of 100 miles an hour, the inventor states, could be maintained safely and economically with a properly constructed line. When running at high speed, planes beneath the car would be moved out so that the weight would be partly supported by the air and essentially the same smoothness of motion obtained as with an air craft, little or no strain then being exerted upon the track.

DEVICE OPERATES WINDOW BLINDS FROM INDOORS

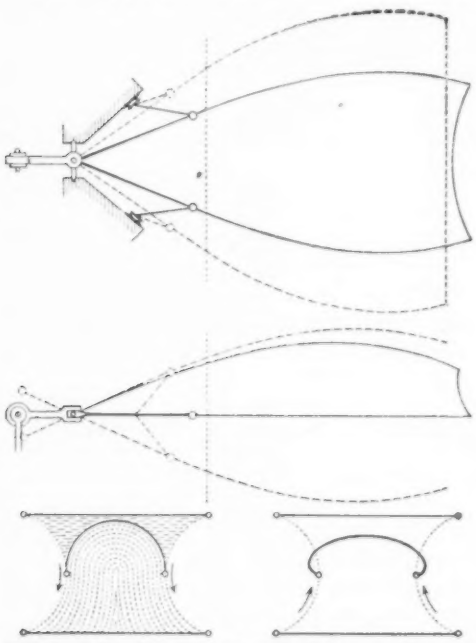
The old method of opening and closing window blinds by opening the window, leaning out, and seizing hold of them is made unnecessary by a device which is attached to each shutter and enables one indoors to set each blind at any angle without opening the window. The visible portion of this piece of hardware consists of a small polished metal crank fastened to the inner side of the window frame and ordinarily hidden by the curtain. This crank turns a worm gear at the outer end of a shaft that extends through the framework. The threaded end of this shaft meshes with an in-



closed sprocket wheel, rigidly fastened to the post of the shutter hinge. By turning the crank the blind can be swung around to any position within an arc of 180°. The shutters operate independently of each other.

VARIABLE FLAPPING WING FOR FLYING MACHINES

Flight in the same manner as birds, using flapping wings and the soaring



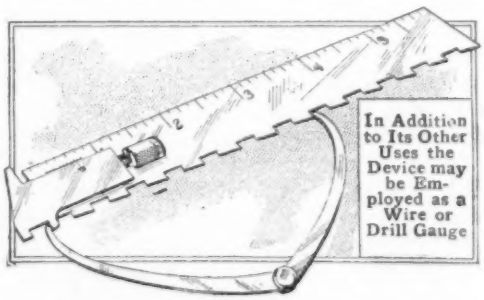
The Dotted and Full Lines of the Diagrams Show the Wing in Top, Side, and Cross Section During Its Process of Flapping

principle, has long interested inventors. An intended improvement in this type of machine was recently patented. Proceeding on the principle that most machines of the bird variety fail in practice because of improper wing design, the new machine is built with a marked change in this feature. The idea is to dispose of the simple harmonic motion of the ordinary type of wing, and by so doing make greater use of the resistance of the air. A flat wing moves slowly at first, attains maximum velocity at the mid-point of its travel, and then decreases speed again until brought to a stop ready for the upward thrust. The air, not being struck suddenly at any part of the stroke, offers little resistance and consequently the motion of the wing produces but small elevating effect.

At the beginning of a stroke the new wing is flat and fully spread out, due to the fact that a pair of short levers hold the outer ribs far apart. Midway down, however, the cross section takes on a semicircular form, caused by the ribs coming closer together and allowing the cloth to bulge upward. At the bottom of the stroke the ribs again spread wide apart, suddenly expelling the air accumulated in the bulge, and giving the machine a considerable upward lift as a result. The inventor believes this type of construction to be a considerable step toward a practical flapping-wing machine.

SIMPLE MEASURING DEVICE USED WITH CALIPERS

Adjustment of a caliper to a one-thousandth part of an inch may be quickly accomplished by means of a new measuring device which has recently been patented. Essentially it consists of a rule with a series of equidistant lugs along its lower edge and provided at one end with a movable head. The latter has a shank that is accommodated in a slot and provided with an axial socket. A micrometer screw engages with the shank and permits the head to be accurately set. The caliper grips lugs on the scale and head



In Addition to Its Other Uses the Device may be Employed as a Wire or Drill Gauge

and is opened to the desired point by turning the screw. The device also serves as a hook scale.

BETTER SCREW CUTTING IN ALUMINUM

A special lubricant which makes possible much more satisfactory work in cutting screw threads in aluminum than has been secured heretofore, is now employed by an English firm engaged in filling a large order for certain aluminum parts for shells. It has been a common experience in cutting threads in aluminum that many threads are destroyed and others are very imperfect; even with handwork, variations are practically unavoidable. The firm referred to has not revealed the nature of the lubricant it is using, but it is enabling its workmen to turn out the parts at a very rapid rate.

POLICEMAN'S SAFETY KEY FOR PATROL BOXES

A key for patrol boxes is now being manufactured of a special nonconducting composition, as hard as metal, which will prevent a policeman from receiving an electric shock when unlocking a patrol box, as sometimes happens in using a metal key where there is faulty insulation in a police telephone or telegraph system. As an additional precaution a shoulder is constructed around the center of the key to prevent the user from inadvertently touching the metal box while unlocking it.

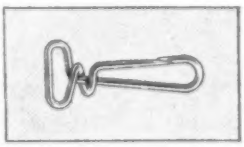
CASE OF SMALL PHONOGRAPH SIMILAR TO BIG MACHINE'S

One of the novel features of a new low-priced phonograph lies in the design of its cabinet, which is virtually a copy in miniature of that housing one of the more expensive instruments. It is 22 in. high, and 11 by 13 in. in its horizontal dimensions. It plays disk records of any kind, is made of metal, and has a mahogany finish. In addition to being intended for the home, it is suited for use in motorboats, canoes, and around camps. It is easily moved, and when not in use may be stored in a closet or out-of-the-way corner if desired. Its general appearance and size also make it well suited for a children's playhouse, or nursery.

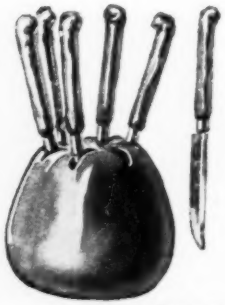
Small Talking Machine with Cabinet Designed after Those of Certain Standard Instruments: Its Size Makes It Suitable to Use When Camping

STRONG HARNESS SNAP MADE FROM ONE PIECE OF WIRE

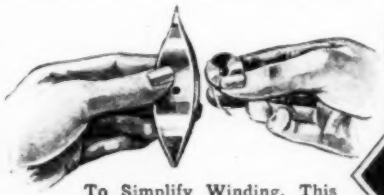
For use on harness, horse blankets, tents, and other articles to which metal fasteners are frequently attached, a steel-wire snap is being made which is intended to replace the type which employs coil or other springs. It is twisted into shape from one piece of material, the two ends of which are flattened. It appears to be of durable construction and reasonably strong, while it can be easily manufactured at a very small cost.



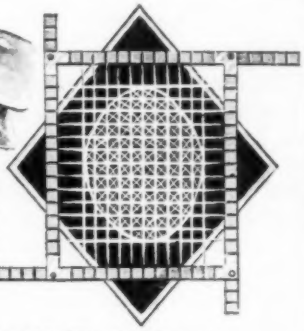
SOME NOVEL AND LITTLE KNOWN ACCESSORIES



Six Fruit Knives are Held in an Apple-Shaped Receptacle That may be Used on a Buffet



To Simplify Winding, This Tatting Shuttle is Fitted with a Removable Spool That may be Filled on a Sewing Machine or by Hand. Extra Spools Are Available



Adjustable Weaving Frame with Which Table Mats, Centerpieces, and Similar Articles of Various Sizes and Shapes may be Made

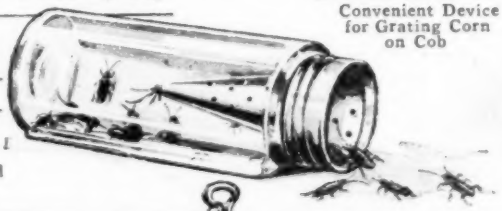
Wall Lamp Suited for Boudoir, Consisting of a Frosted Globe Fitted in a Candle Socket of Push-Button Type, That Fits Ordinary Bracket

This Instrument, When Traced between Points on a Motorist's Road Map, will Indicate the Mileage

Fresh, Clean Broom Straws of Uniform Length Packed in Neat Paper Container Serve as Sanitary Cake and Bread Testers on Baking Day

Convenient Device for Grating Corn on Cob

Portable Shaving Stand with Adjustable Electric Lamp, Which, if Desired, may be Fitted with a Shade. The Mirror Is of Adequate Size and may be Turned to Any Angle

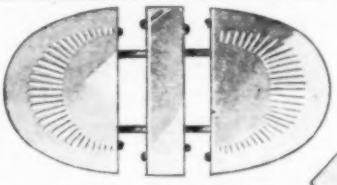


Glass Jar Fitted with Cone-Shaped Tube Constitutes a Roach Trap for Household Purposes

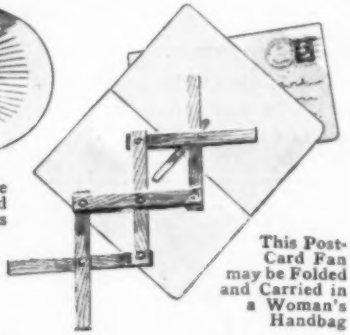
Here is Presented a New Application of an Old Idea: A Vacuum Washer Operated with a Lever Attachment That may be Readily Fixed to any Washtub

INTENDED FOR THE HOME AND ITS MEMBERS

Small Pocket in Lining of Shoe Provides Safe Place to Carry Bills of Large Denominations



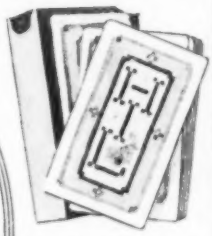
Adjustable Trivet for Table Use Which may be Extended Approximately Four Inches



This Post-Card Fan may be Folded and Carried in a Woman's Handbag

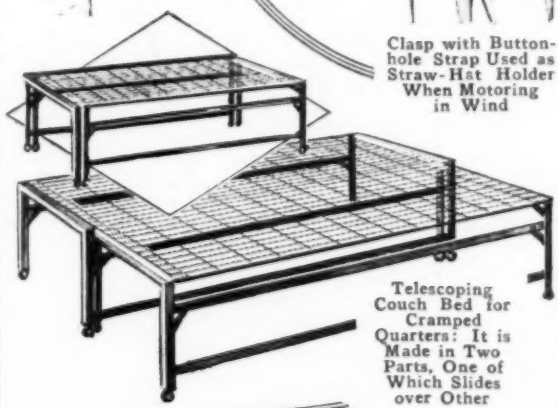
A Clothesline Need Not be Fastened by Means of a Knot When This Hook is Used

Clasp with Buttonhole Strap Used as Straw-Hat Holder When Motoring in Wind

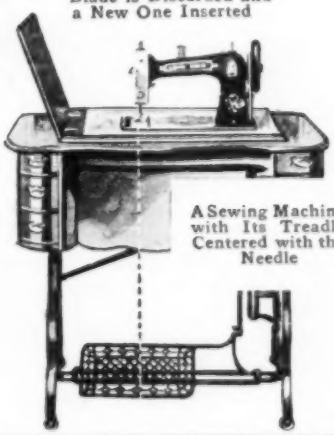


Playing Cards Bearing One's Initials Are Available in an Odd Design Having a Cross-Stitch Effect

Safety-Razor Convenience in a Desk Knife: When Dull, a Blade is Discarded and a New One Inserted



Telescoping Couch Bed for Cramped Quarters: It is Made in Two Parts, One of Which Slides over Other

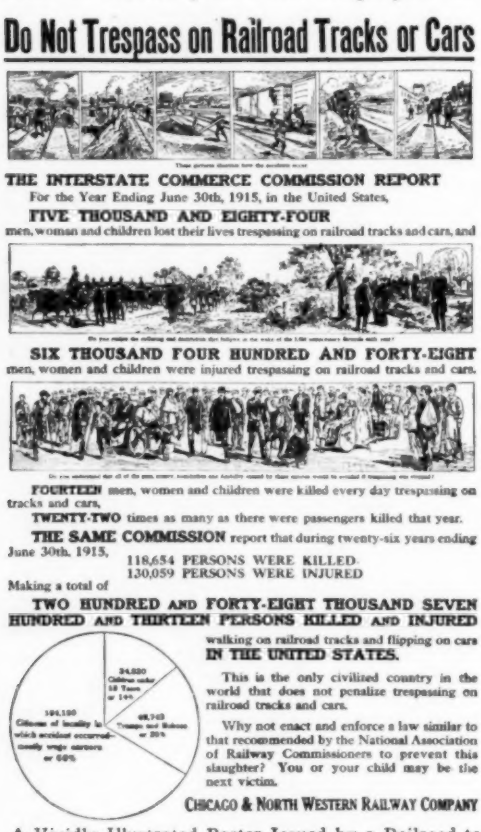


A Sewing Machine with Its Treadle Centered with the Needle

When Using a Couch Hammock as a Cot, These Folding Steel Legs Serve as Supports

POSTER ILLUSTRATES PERIL OF TRESPASSING

A western railroad which has made notable reductions in its accident records in recent years has employed as


Do Not Trespass on Railroad Tracks or Cars
THE INTERSTATE COMMERCE COMMISSION REPORT
For the Year Ending June 30th, 1915, in the United States,
FIVE THOUSAND AND EIGHTY-FOUR
men, woman and children lost their lives trespassing on railroad tracks and cars, and
SIX THOUSAND FOUR HUNDRED AND FORTY-EIGHT
men, women and children were injured trespassing on railroad tracks and cars.
FOURTEEN men, women and children were killed every day trespassing on tracks and cars,
TWENTY-TWO times as many as there were passengers killed that year.
THE SAME COMMISSION report that during twenty-six years ending June 30th, 1915,
118,654 PERSONS WERE KILLED
130,059 PERSONS WERE INJURED
Making a total of
TWO HUNDRED AND FORTY-EIGHT THOUSAND SEVEN HUNDRED AND THIRTEEN PERSONS KILLED AND INJURED
walking on railroad tracks and flipping on cars
IN THE UNITED STATES.
This is the only civilized country in the world that does not penalize trespassing on railroad tracks and cars.
Why not enact and enforce a law similar to that recommended by the National Association of Railway Commissioners to prevent this slaughter? You or your child may be the next victim.
CHICAGO & NORTH WESTERN RAILWAY COMPANY

A Vividly Illustrated Poster Issued by a Railroad to Warn All Classes of People against Trespassing

one of its very effective means of teaching "safety first" an illustrated poster headed in bold letters: "Do Not Trespass on Railroad Tracks or Cars." A group of pictures beneath this line show six ways in which avoidable accidents happen. One of these represents workmen, ignorant of an approaching train, returning from work via the railroad's right of way. There are two larger illustrations. One of these is of a funeral and a burial; it is headed with a statement that 5,084 persons lost their lives trespassing on railroad property in the United States in the year 1914-15. The other drawing illustrates very vividly an additional statement as to the great number of persons who are injured by the railways.

GOOD AND BAD POINTS FOR FARM TRACTORS

Having secured information from nearly 200 farmers in the Illinois corn belt, who have used tractors of various sorts, the Department of Agriculture has compiled data relating to the advantages and disadvantages of that form of machinery, which will be of great value to all who consider the advisability of supplanting some of their horses with tractors. The fields of the farms considered range in size from 20 acres up, and the tractors include outfits drawing from two to eight plows. These various factors in the investigation give it a representative character which makes its conclusions applicable to the average farms throughout the country.

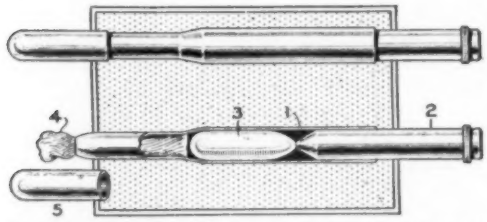
In the opinion of the operators the chief advantages of the tractors for farming are: ability to do heavy work and do it rapidly; to save man labor and hence dispense with some hired help, and to plow a good depth, especially in hot weather. The chief difficulties encountered have had to do with efficiency in operation and the packing of the soil when it is damp. It seems to be the consensus of opinion that the purchase of a tractor seldom lowers the actual cost of operating a farm, and its purchase must usually be justified by increased returns. For farms of 200 acres or less, three-plow tractors are recommended; for farms from 200 to 450 acres, four-plow machines are regarded as preferable; also on farms of from 450 to 750 acres four-plow outfits are considered the best, although some farmers prefer five and eight-plow outfits. A 140-acre farm is the smallest on which the smallest tractor in common use, the two-plow outfit, may be expected to prove profitable. Medium-priced machines appear to have been the most profitable, on the average. The life of the tractors, as estimated by

their owners, varies from six seasons for the two-plow, to 10½ seasons for the six-plow equipment.

Approximately 2½ gal. of gasoline and ⅕ gal. of lubricating oil are ordinarily required to plow one acre a depth of 7 in., regardless of the size of the tractor. The machines plow an average of 1½ in. deeper than horse-drawn plows. The investigators point out that any data of this sort soon becomes obsolete because of improvements and changing fuel prices, though they feel that their figures apply quite accurately to the spring of this year.

ANTISEPTIC CARTRIDGE FOR CLEANSING WOUNDS

A compact sterilizing outfit for emergency use by wounded soldiers in the war is now used in the German army in preference to the vial of iodine which is common among the allies and often is broken or otherwise proves unsatisfactory. This antiseptic cartridge, as it is called, consists of an aluminum case in which is a thin glass capsule filled with iodine. Above the capsule is a plunger that can be pressed down by the finger, breaking the capsule and causing the liquid to be absorbed by a wick at the opposite end of the cartridge. A portion of the wick, ordinarily covered with a cap, extends from the aluminum case and is used in swabbing out the wound. When once used the device is discarded.



This Aluminum Case (1) Contains a Capsule of Iodine (3) Which can be Broken by Pressing the Plunger (2), Thereby Causing the Wick and Swab (4) to Absorb the Antiseptic Fluid. A Cap (5) Protects the Wick

This compact, always available emergency outfit is said to be in a large measure responsible for the recovery of a large number of German wounded.

BOX BED SPRINGS MADE IN THREE SECTIONS

Convenience and durability are special characteristics of a new type of box springs which are made in three

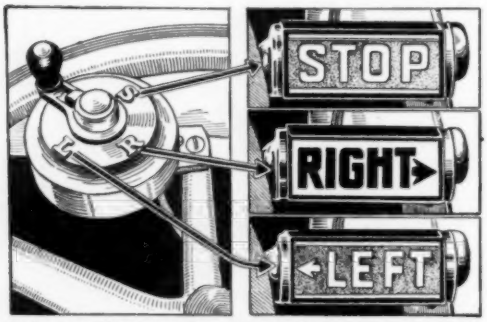
Box Springs Made in Three Sections so That They Are Not Cumbersome to Move and, Being Interchangeable, will Last Longer

sections. The ordinary box springs are made as a single unit and are cumbersome to handle. The three sections of the new style each weigh 30 lb. and consequently can be removed for airing or cleaning without serious inconvenience. Each individual spring in these sections is fastened at the top, center, and bottom and yet acts freely and independently of the others. The sections are interchangeable and so will last longer than the box springs made in one section.

ELECTRICAL REAR SIGNAL FOR MOTOR CARS

A rear-signal system for motor cars which is now on the market possesses merit because of its simplicity and the ease with which it can be installed. A dust-proof case at the rear of the car displays through a glass face one of four signals. Three small wires are all that connect this part with the controlling mechanism, consisting of a

small circular case fastened to the steering wheel and from which projects a movable handle. The signals are operated from a storage battery or

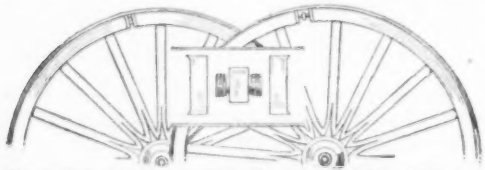


This Rear-Signal System for Motor Cars is Operated from the Storage Battery or from Dry Cells: Three Wires Are All That Connect the Operating Mechanism with the Signals

from dry cells, and as soon as one is set the current is automatically shut off so that little is consumed. Four letters, "S," "R," "L," and "O," on the face of the controlling mechanism correspond to four signals, any one of which may be displayed by properly setting the movable handle. The signals are: "Stop," in white letters on a red background; "Right," in black letters on orange background; "Left," in white letters on a green background, and a plain white surface. Each time the signal is changed a small bell rings to show that the system is working. At night the signals are illuminated.

TIGHTENER DISPENSES WITH SHRINKING OF TIRES

A new method has been devised to stop a buggy or wagon wheel from rattling. Instead of having the black-

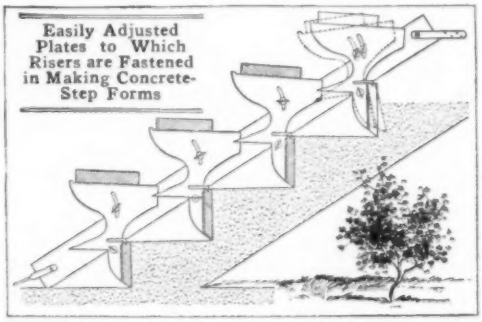


The Expansion Screw, Which may be Adjusted from Time to Time, Stops a Wheel from Rattling When Its Tire Becomes Loose

smith remove a tire and shrink it on again to compress loose parts, the new process provides an expander bolt for the purpose, which is fitted into the wheel rim. A section of the felly is cut out in order to give necessary room for this expansion. With a tire already in place, the bolt is turned, forcing the wooden rim tight against the outer steel hoop. As a result all looseness in the rim is taken up.

PLATES SIMPLIFY MAKING OF CONCRETE STEPS

Quickly adjustable plates for building concrete steps have been devised to do away with the expensive carpenter work usually necessary in preparing forms for steps. These plates are of malleable iron, and by means of adjusting bolts are fastened to the channel bars, or joists, set at the proper angles either side of the steps. By sliding the plates on the bars, and employing the scales marked on a rear



Easily Adjusted Plates to Which Risers are Fastened in Making Concrete-Step Forms

perpendicular edge and a front horizontal edge, one can quickly and accurately set the plates for steps of the desired width and height. The riser boards for retaining the concrete are fastened in place simply by pounding them against prongs on the perpendicular edge just below the bar, and by driving a pointed hook into the upper edge of the riser. For workmen's use planks may be laid on the brackets which form the upper part of the plates.

¶For the first time since the establishment of the naval base on San Francisco Bay ocean tariffs are such that coal for the Pacific coast warships will be shipped overland.

THE CHILDREN'S PAGE OF NEW IDEAS

A Hollow, Perforated Ball Filled with Catnip Is a Toy Much Appreciated by Kittens

Odd Wooden Hoop Decorated with Picture of Man Racing a Bear. The Chase is Hastened When Device is Rolled

Practical Feeding Tray, for Dog or Cat, with Wooden Frame and Metal Pan

Homely, Hardwood Dog Crawls Out of Kennel When One Calls Him: The Mechanism is Controlled by a Microphone Sensitive to Sound Waves

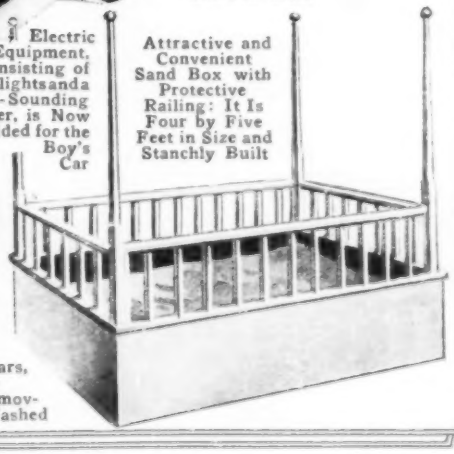
Clock golf is a new lawn sport particularly suited for children. A circle several yards in diameter is marked off with lime or tape on a level plot of turf. At proper intervals the 12 numerals of the clockface are spaced about the circumference and so inclined as to be readily visible to the players. Before each of these plates is a hole. The game consists of knocking the ball into each of these cups in succession with the least possible number of strokes. The game trains the eye and the hands.

"Bunny" Slippers Made of White Felt, with Button Eyes and Fur Tails

Electric Equipment, Consisting of Headlights and a Loud-Sounding Buzzer, is Now Provided for the Boy's Car

Flower Holder of a Type Especially Suited for the Nursery. It Is Eight Inches in Diameter and Provided with a Glass Flower Block

"Mary's Lambs," Teddy Bears, and Puppies of the Stuffed Variety are Made with Removable Skins That may be Washed



Attractive and Convenient Sand Box with Protective Railing: It Is Four by Five Feet in Size and Stanchly Built

SIRUP MADE AT LOW COST BY NEW PERCOLATOR

For soda-fountain, hotel, and similar uses, a simple, moderate-priced sirup maker has been devised which enables a retailer to make the product at the bare cost of the sugar used. In addition to giving him a sirup which he knows to be pure and clean, it saves him the manufacturer's and middleman's profits. The device is a percolator made in two parts, a sugar container and sirup-storage tank, the one mounted on the top of the other. To make a gallon of sirup, 7 lb. of sugar is placed in the upper receptacle, which has a perforated bottom, and water added. This is essentially all that needs to be done, for the sirup is made by a cold percolation process and drips into the reservoir below, from which it may be drawn off as needed. The device is made of metal, finished in white enamel, and provided in various sizes having capacities ranging from 5 to 50 gal. daily.

PROCESS STOPS "BLEEDING" OF CREOSOTE BLOCKS

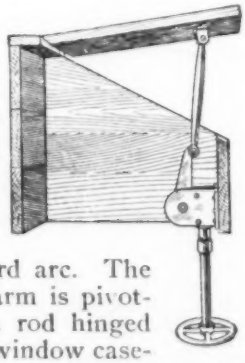
A common objection which has been raised to creosote blocks for paving has been that in hot weather the rays of the sun cause the oil in the wood to ooze out and form a coating on the surface of the street, which is particularly unpleasant for pedestrians. The Forest Products Laboratory maintained by the United States government at Madison, Wis., has announced that it has perfected a process which entirely prevents this "bleeding," as it is called. Creosote blocks subjected to this treatment remain dry, it is said, under the rays of the sun on the warmest days, and even in an oven with a temperature of 212° Fahrenheit.

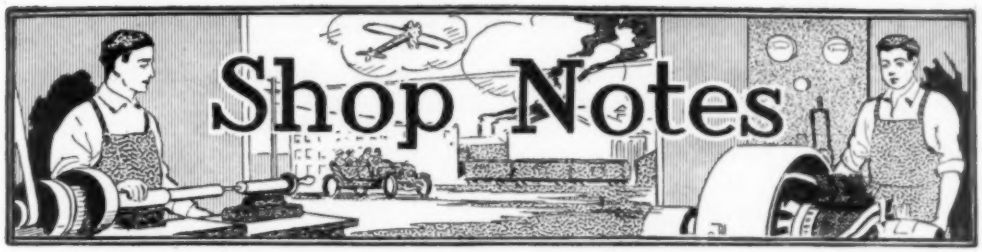
METALLIC TITANIUM USED TO MARK AND CUT GLASS

It has been found that there are certain unusual features which characterize the way in which metallic titanium marks and cuts glass. The cut produced by it is not like that made by a diamond or other hard substances. This metal leaves a silvery streak which is indelible but does not weaken the glass, the portion of the pane or article marked with the titanium being stronger, relatively, than that which remains uncut. It is evident that this element in its metallic state furnishes a convenient means for marking or ornamenting glass.

SKYLIGHT LIFT OPERATED BY HANDWHEEL

A strong, simple skylight lift now on the market is operated by a handwheel fastened to a support that extends downward from the skylight frame. By turning the wheel a worm gear at the upper end of its axle causes an arm to move in an upward arc. The outer end of the arm is pivotally fastened to a rod hinged to the edge of the window casement. By moving the handwheel the window can be opened any desired amount; the device is self-locking and is capable of raising a window weighing 100 lb. The working parts are inclosed in a bronze housing.





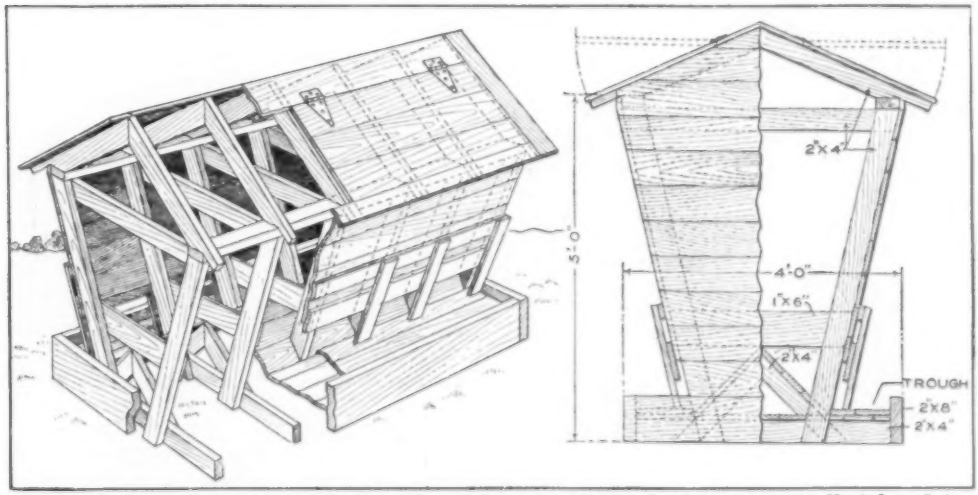
A Self-Feeder for Hogs

By W. E. FRUDDEN

WHILE a self-feeder is not desirable for general use in swine feeding, it has been found practical in the quick fattening of nearly grown shoats or young hogs, and is a useful device where many hogs are to be fed. The feeder shown in the illustration is simple in construction and may be made in the farm workshop. At the left is a sketch with portions cut away, exposing the interior construction. The view at the right shows the end of the feeder, with the right half cut away to show the details of the framing. No length is given, as this may be varied to suit individual needs.

The framework consists of sections built up of 2 by 4-in. material and set on 18-in. centers. Fixed to them, at the bottom, are 2 by 4-in. supports for the ridge-shaped bottom of the feed bin. The sections are 5 ft. high to the upper side of the plate, as shown in the sectional view, and 4 ft. wide at the top and bottom. They are strongly braced, to resist the pressure of the contents, 2 by 4-in. braces being used at the top and 1 by 6-in. braces at the apex of the bottom of the bin.

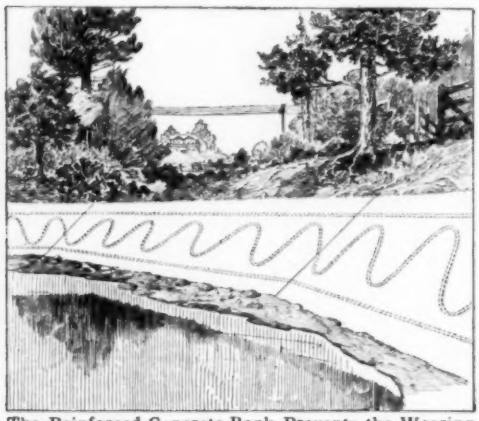
Tongue-and-groove stock is best for the flooring and siding, as well as the roof, and should be not over 6 in. wide. The flow of the feed into the trough is regulated by an 8-in. board, 1 in. thick, fitted to slide vertically along the sides above the trough, behind cleats. The rafters are of 2 by 4-in. stock and may be set at a convenient pitch, one to three, as shown. The lids extend one-half the length of the feeder, but may be made the full length if not too heavy. They are supported on strap hinges and have sufficient overhang at the eaves and gables to protect the feeder from rain. Skids may be provided for transportation.



The Self-Feeder Saves Time in Feeding a Large Number of Hogs. Its Length may be Varied to Suit the Needs. The Quantity of Feed is Regulated by a Sliding Gate

Stream-Bank Protection

Protection against washouts on the outer side of a curve in a stream was afforded by building a slanting concrete wall at the point where the wear



The Reinforced-Concrete Bank Prevents the Wearing Away of the Earth at a Sharp Curve in the Stream

occurred. The sketch shows the concrete bank reinforced to withstand the heavy action of the water during freshets. Old steel hoisting cable was used to tie the various sections together. This was considered a good method of reinforcement in that it will hold the sections in place even after long wear and the action of the frost cracks them apart. Dangerous undercuts and cave-ins may be overcome by such a protection.—J. J. O'Brien, Buffalo, New York.

Spring-Cushioned Chair Legs

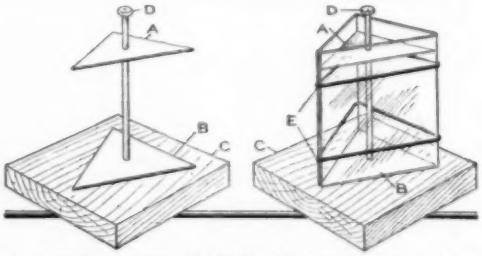
Coiled springs fixed to the legs of a chair or stool will give elasticity and prevent much of the discomfort ordinarily attendant to sitting on a chair or stool for hours at a time, as many workers must do. The springs should be fitted tightly over the bottom ends of the chair legs and should be of uniform height and tension. They must be strong enough so that the weight of a person will not cause them to collapse completely. A chair so fitted with springs permits the tilting of the seat backward or forward and gives much of the ease of a tilting-top chair. —C. M. Pfennig, Bristol, Conn.

Patching Veneer on Curved Surface

A small piece of veneering was broken from the front of a dresser drawer, the shape of which was such as to make clamping difficult. Several corks were placed against the curved surface to which the patch was to be fixed, and, when the clamp was applied from the inner surface of the drawer front, the corks gave a pressure along the sections of the curve. Their use had the added advantage that the front of the drawer was not marred. — Charles Fischer, Schenectady, N. Y.

Glass Prisms for Experimental Purposes

Glass prisms are sometimes desired for use in experiments, and the method of making them described is both practical and rapid. The process used was as follows: Two similar triangles, A and B, shown in the sketch at the left, having the desired angles and slightly smaller than the prism was to be, were cut from cardboard. Three pieces of window glass, having widths corresponding to the edges of the triangles and a length equal to the height of the prism, were cut. The triangle B was tacked to a block of wood, C. A coating of paraffin was applied to its upper surface and edges by using a heated rod, held in a pair of pliers and applied to a block of paraffin somewhat as when soldering. The surplus paraf-



A Glass Prism was Made by Fitting Sheets of Glass around Triangles, and Binding the Joints with Paraffin

fin was scraped from the edges of the triangle, and a nail, D, was driven through the center of triangles A and

B, slightly into block C. The triangle A was adjusted as shown in the sketch at the left. The sheets of glass were then placed against the edges of the triangles and held in place by the rubber bands E. Paraffin was applied to the joints of the glass and around the lower triangle. The nail and the triangle A were removed carefully, and three coats of shellac were applied over the paraffin joints and the wooden base. The prism was then filled with water and was ready for use.—H. W. Offins, Grants Pass, Ore.

Drawing Pen Used as Emergency Forceps

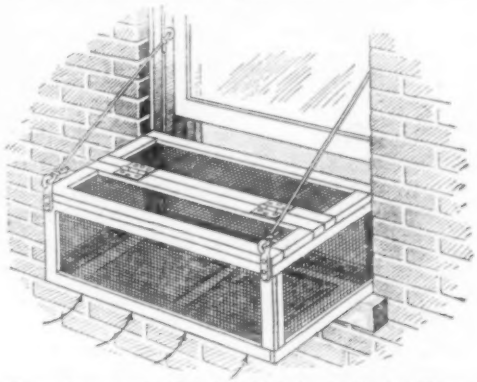
A ruling pen of the double-nib variety may be used as an emergency forceps to remove slivers or other small substances which may find their way into the hand. The nibs should be cleaned in carbolic acid or otherwise made antiseptic. If the handle of the pen screws into place and has a sharp needle at the joint, as is common, this may be used to locate slivers and should also be made antiseptic.

Special-Size Thumbscrews Made Quickly

Requiring several thumbscrews of a special size, I devised the following method of making them: Ordinary fillister-head screws of a size to fit the work were used. A piece of sheet metal was driven tightly into the slot in the head and cut to the proper shape. The edges were filed and smoothed with emery cloth, and the screws proved satisfactory both as to appearance and use.—Monroe D. Dreher, Newark, N. J.

Blueprint Drier for Indoor or Outdoor Use

The case made of wooden strips fitted with panels of wire mesh, shown in the illustration, may be used on either the outer or inner sill of a window for the drying of blueprints. In warm weather it may be used in the position indicated, the prints being placed on the screened surface of the bottom. A free circulation of air is afforded and the prints dry quickly. When weather conditions do not permit its use out-

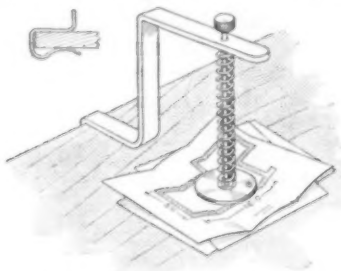


Blueprints may be Dried Quickly in the Device Shown, Outdoors When Convenient, or Indoors over a Radiator

doors, the drier may be set on the inner window sill over a radiator. Snap hooks with appropriate attachments on the window frame on both the inner and outer side, must be provided.—John Havekost.

Paper Holder for Desk or Workbench

Papers or drawings on a desk or workbench, that must be referred to from time to time, may be cared for in the manner shown in the sketch. The device is made of a strip of sheet brass, or other metal, and clamps to the edge of the desk top, as indicated in the small sketch. The papers are held down by a flat disk attached to a rod around

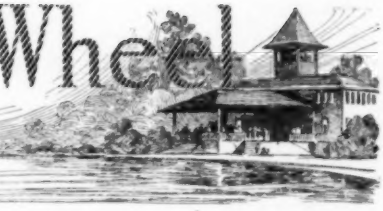


The Holder Permits a Considerable Number of Papers to be Filed under It Temporarily

which a coiled spring is fixed to exert a pressure on the disk. A considerable number of sheets, or only a few, may be cared for in this way.

The Water Joy Wheel

A New Beach Device



By R. B. ALLEN

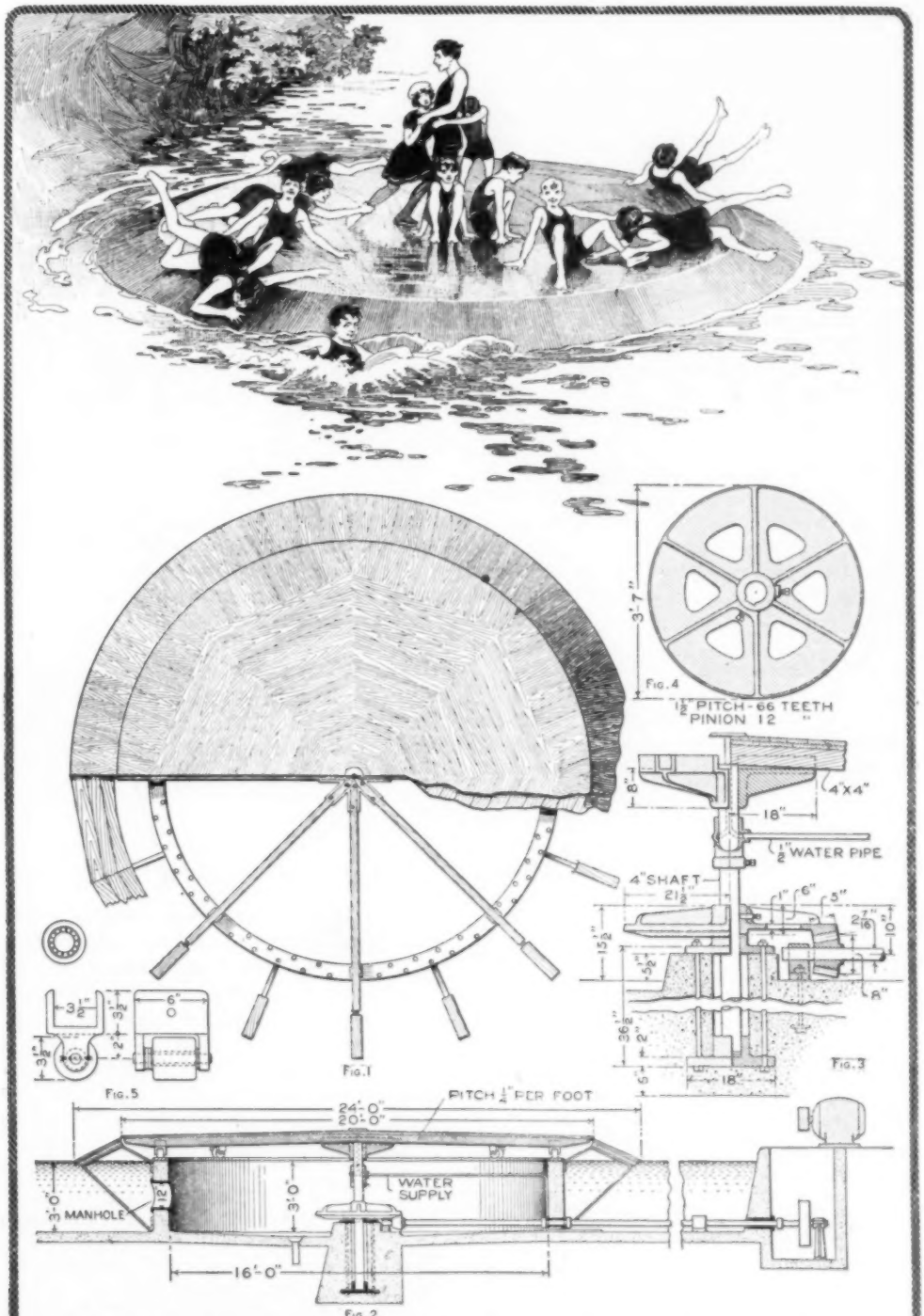
THRILLS in plenty are afforded visitors to a western beach park by the water joy wheel, installed in three feet of water primarily for the amusement of beach bathers. Onlookers enjoy the sport as well, and to see a group of bathers clinging desperately to the revolving wheel as it gains momentum, finally tumbling even the most adroit into the water, is not without thrills. The joy wheel in operation is shown in the upper sketch and below are given the details of the construction and operation of the device. The center table, over which a stream of water plays, is built up of hardwood flooring, carefully matched, and is connected to the driving mechanism. The slanting apron is stationary and protects the bathers as they are tossed from the rapidly revolving wheel. Constructions somewhat similar in principle have been in use as amusement devices, but the application to the beach, or a shallow pool, is interesting and novel.

The joy wheel was originally designed for use in a concrete basin and the working drawings give the details of construction for the installation of it under these conditions. The fitting of the device to a sand beach would not require the concrete floor shown outside of the cross section of the wheel foundation in Fig. 2, but the concrete base and circular wall to carry the steel ring, or plate, upon which the wheel revolves are necessary. The power could be applied in the manner indicated for the reservoir, and shown in cross section at the right of Fig. 2.

Mechanically the device is interesting, and by examining the detailed drawings, the construction may be understood readily. The wheel proper is 20 ft. in diameter and circular, as shown in Figs. 1 and 2. Its framework consists of wooden beams fitted at the center into a series of iron braces cast in the form of a ribbed, radiating flange. Its construction is shown in detail at the upper part of Fig. 2. It is 8 in. high and 18 in. in diameter. The beams are bolted to it and rest on roller bearings, similar to those of a center-pier drawbridge. The bearings are shown in Fig. 5. They have ball-bearing shafts, and brackets, 6 in. wide, with a 3½-in. opening to fit the beams, which are 3½ in. thick. The construction of the planking of the wheel is shown in Fig. 1, and in section at the top of Fig. 2. Two layers of flooring, pine below and maple above, very carefully laid and polished so as to avoid possible injury to the bathers, form the covering of the wheel as well as the apron. The latter is supported on brackets, fixed to the sides of the concrete wall which supports the circular steel plate, shown in Fig. 1, upon which the bearing wheels of the center table ride.

The general mechanical details may be best understood from the sectional views shown in Fig. 2. A motor, which furnishes the power, is mounted above a concrete manhole on the beach. A belt transmits the power to a counter shaft at the bottom of the manhole, and this is in turn connected with the long shaft which engages the main vertical driving shaft of the large wheel or revolving table. Stuffing boxes, indicated by the black sections where the long shaft passes through the concrete walls, prevent the water from entering the manhole at the right and the central pit under the table. Bearings for the shaft are also provided on the floor of the reservoir.

The main driving shaft of the table is 4 in. in diameter, and rests at its



The Water Joy Wheel Affords Amusement to the Spectators as Well as the Bathers Who Attempt to Retain a Hold on the Slippery Wheel in Spite of Its Increasing Speed. The Details of Construction are Shown in the Working Drawings. A Top View of the Table is Shown in Figure 1, with the Planking Partly Removed to Expose the Supporting Frame. A Sectional View of the Device is Presented in Figure 2. The Gearing and Shafting, and Their Arrangement in Relation to the Vertical Shaft are Shown in Figure 3, the Driving Gear in Figure 4, and the Bearings in Figure 5

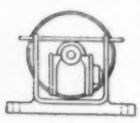
lower end in a steel-flanged concrete foundation, as shown in Fig. 2 and in detail in Fig. 3. Its upper end engages the radiating-brace flange at the center of the table. The end of the long shaft nearest the main driving shaft rests in a bearing, as shown in Fig. 3, and near it is fixed an 8-in. bevel-gear pinion of 12 teeth. This meshes with a pinion, 3 ft. 7 in. in diameter, and of 66 teeth, shown in detail in Fig. 4, and which is keyed to the main driving shaft.

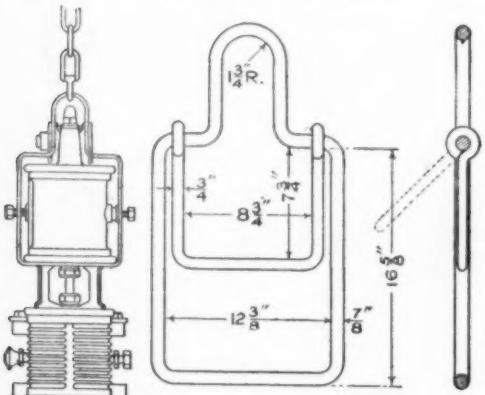
The method of conducting the water supply to the center of the table is shown in Fig. 2, and in detail, as it reaches the outlet, in Fig. 3. The water is pumped into a tank set above the level of the outlet on the revolving table and is fed to it by gravity. By reference to the upper part of Fig. 3 it may be observed that the water-feed pipe is fitted to a collar having a hollow bead cast at its middle. The vertical shaft is bored to permit the water from this hollow bead to pass upward and out of the spout when the shaft is revolving. The continual flow of water over the surface of the table is essential to the proper operation of the device, as it is more difficult to retain a hold on the wet surface, and a dry surface might cause injury to the bathers.

The table is started slowly and controlled from the motor by the operator in charge. The speed is gradually increased with the result that the bathers find it difficult to remain on the wet surface. Their antics in attempting to retain a hold cause no end of amusement to both the participants and the spectators, and invariably result in the table being cleared as the speed is increased sufficiently.

A Locomotive Air-Pump Lift

The illustration shows a device for lifting air pumps from the floor to their place on the locomotive or for removing them, and also for carrying them from one place to another. The long part is placed under the upper, or steam, cylinder, and the part which turns on the main piece is thrown back and down over the valve chamber. In this position the device is held in place with a piece of rope, tied in the back from side to side, to hold the lower part against the casting between the air and the steam cylinder, the top also being tied down for safety.—Joseph K. Long, Renovo, Pa.





A Yoke to Slip on an Air Pump so That It can be Lifted with a Hoist

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Oiling an Automobile Cone Clutch

Cone clutches on motor cars are usually leather-lined, and in order to keep this leather in condition, it should be treated occasionally with neat's-foot oil. If it is permitted to become dry the clutch takes hold with a jerk, which is annoying to passengers and causes wear on the mechanism. This condition results in what is termed a "fierce" clutch.

Refacing is soon necessary, since the leather, being dry, wears rapidly. A squirt can should be used in forcing the oil between the parts of the clutch. If necessary its spout may be flattened slightly in order to reach the parts easily.—Donald A. Hampson, Middletown, N. Y.

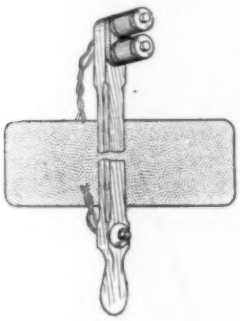
¶Scissors should be ground so that the points match precisely.

Removing Insulation Quickly

Insulation may be stripped from wire quickly by cutting rings around it with a knife at intervals of about 2 in. and tapping the wrapping with a hammer on a block of metal or hard wood. The sections of insulation may then be removed at the end of the wire. If the end of the wire is fixed, it may be necessary to cut the small sections longitudinally after they have been loosened.

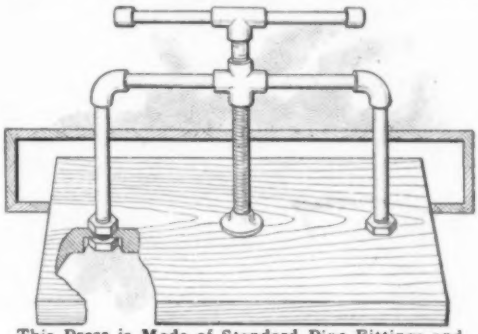
Electromagnet Used to Place Letters in Score Board

Placing metal letters in bulletin or score boards, which are usually fixed at a considerable height, may be readily accomplished by the use of the electromagnet device shown in the sketch. It has other uses which will appeal to persons called on to handle metal material of small size in bins or compartments out of reach. The magnet is actuated by a battery which may be set into the handle if the articles to be handled are quite small. Otherwise, it may be attached to the handle. A push button controls the action of the magnet, and the letters or other articles may be released when in place by removing the thumb from the push button.—J. S. Hagans, Toledo, O.



Press Made of Pipe and Fittings

The illustration shows a press by means of which considerable force may be brought to bear in drying pasted articles or other material under pressure. It is made of standard pipe fittings supported on a board. The end supports are fixed into the base by means of hexagonal nuts fitted above and below. A board, or other construction to distribute the pressure over a large area, may be fitted to the lower end of the screw. The thread in the cross fitting in which the screw operates should be run through in the vertical direction and of a size to give proper clearance for the threaded pipe.

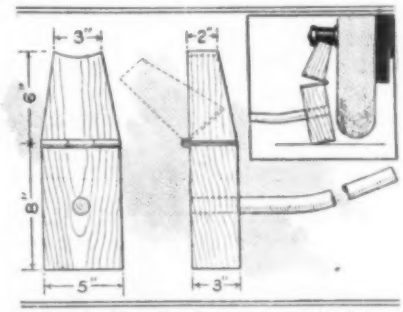


This Press is Made of Standard Pipe Fittings and may be Used for Various Purposes

Automobile Jacks Save Tires

The weight of an automobile on the tires, particularly when they are not fully inflated, as is often the case in a garage, is injurious. This may be counteracted by providing jacks of a type shown in the sketch.

They are made of heavy stock, hinged so that pressure on the bar will release the weight from them. A pipe may be used for the lifting bar or even a stout wooden rod. The small sketch shows the method of applying the jacks.



Removing the Weight of an Automobile from the Tires While in the Garage is Readily Accomplished with Jacks

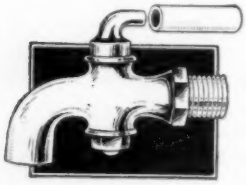
¶ Putty should be stained to match the finish before applying it on high-grade work.

Cap Keeps Dust Out of Carburetor

Sticky needle valves are frequently causes of annoyance to motorists. Dust and grit enter the float chamber of a carburetor through the opening from which the stem of the valve projects. A cap fitted over the exposed end of the valve stem effectively overcomes this trouble. The illustration shows the cap knurled on one end so that it may be easily removed.

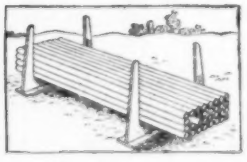
Safety Key for Faucets

Tampering with faucets on barrels of oil, molasses, and other liquids, may be prevented by adapting the faucet handle to a pipe key, as shown in the illustration. The handle was cut off with a hacksaw to within ½ in. of the stopper, and the portion remaining was fitted to a piece of ½-in. pipe. The latter was placed on a shelf, inaccessible to children or others who might disturb the faucet.—Stanley Radcliffe, Laurel, Md.



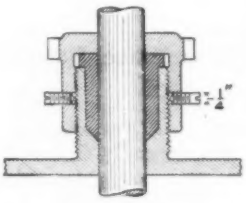
Portable Pipe Rack

A contractor found the pipe rack shown in the illustration convenient and economical, particularly in storing pipes in winter weather. Not a little damage is done to pipes that are permitted to lie in contact with water or snow, which is often the case when buildings are under construction. The racks were made of cast iron, and the flanges as well as the uprights are about ½ in. in thickness. The contractor transports them from place to place as they are needed, and they are strong enough to withstand rough usage.—A. E. Holaday, Naugatuck, Connecticut.



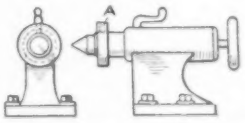
Holding a Water-Pump Gland Nut

The gland nut which held the piston-rod packing on a water pump caused considerable trouble in constantly coming loose. This was due principally to the constant vibration, and also to the worn-out condition of the threads. A new nut was purchased, but the thread on the cylinder was found to be the one worn out, so this did not relieve the trouble. Two ordinary headless setscrews were then tried out with success and the trouble was eliminated.



Prevents Loosening of Tail Center in Lathe

The tailstock center of a lathe frequently is forced out of its spindle when the operator spins the handwheel in working rapidly. The falling out or loosening of the center causes delay, particularly when a large number of pieces are to be handled. This was overcome by placing a collar, A, on the spindle, and fixing it into place with a headless screw. The collar takes the thrust against the tailstock and prevents the center from being loosened. The collar may be removed easily when occasion requires.—C. Anderson, Worcester, Mass.

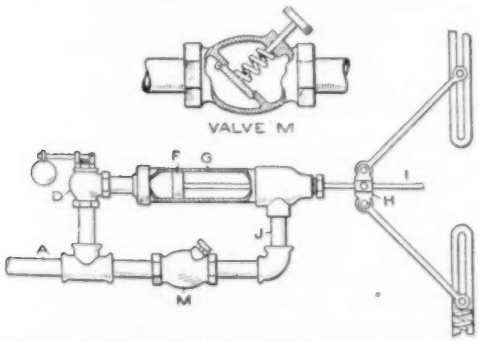


¶The parting tool used to cut off stock in a lathe should be set with its cutting edge at the center line.

Automatic Pressure Regulator

A maximum and a minimum pressure must frequently be maintained, and the device illustrated provides a method of regulating the pressure within such limits by the use of a pressure valve, M, working in combination with a safety valve, D, and a piston chamber, G. The rod I is connected to the toggle brace H, which in turn actuates levers regulating the increase or decrease of the pressure.

Normally the pressure in the pipe A operates on the safety valve D and the pressure valve M without any special result. Suppose that the minimum pressure to be maintained is 40 lb., and the maximum 100 lb. When the pressure has reached 50 or 60 lb., the shut-off between the tank and the regulator is opened. When the pressure has reached 100 lb., the safety valve D will blow off, permitting the air to pass into the chamber G against the piston F, forcing it to the opposite end of the chamber. The action is transmitted to the levers, by means of the toggle brace H, to shut off the pressure. If the pressure falls below the minimum, the spring in the valve M will act on the valve cap, opening it and permitting the air to pass through the nipple J into the chamber G and against the right face of the piston F.

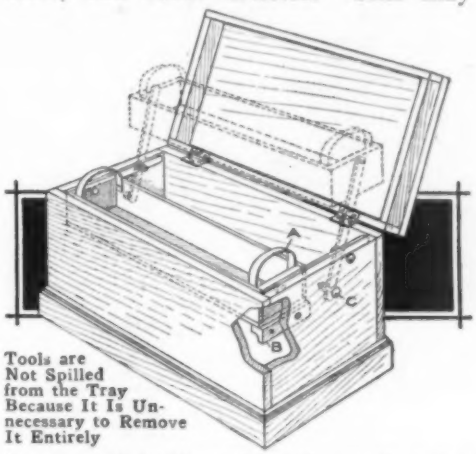


Pressure within a Maximum and a Minimum may be Maintained by the Installation of the Device Shown

The latter will be driven to the opposite end of the chamber, thus actuating the lever control to increase the pressure.—R. R. Rundell, Elmira, New York.

An Improved Tool Box for Mechanics

Some mechanic's tool boxes are provided with a sliding tray for small tools, and other articles. This may



Tools are Not Spilled from the Tray Because It Is Unnecessary to Remove It Entirely

be moved back and forth so that the interior beneath the tray may be seen from both sides of it. The arrangement obstructs the full view of the inside of the tool box, and when it is desired to take a large tool therefrom the tray must be removed. It is often placed on the edge of the box and the contents are spilled accidentally. The illustration shows a tray mounted so as to give free access without removing it entirely.

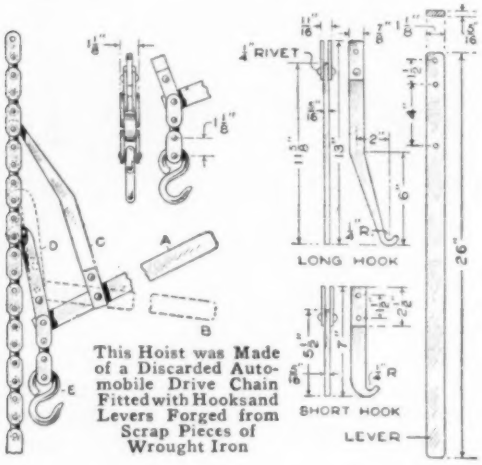
The tray is carried by two strips of iron pivoted at the upper edge of the tool box. It swings with the strips of metal and retains its horizontal position. Handles A are provided to make raising it convenient. The tray rests normally on small strips, B. The pins C act as a stop when the tray is raised. —Joseph V. Gregorich, Chicago, Ill.

Trimming Belt Ends for Lap Joints

A broad wood chisel, the cutting edge of which has been ground to a convex shape, is a convenient tool for roughing out the end of a belt at which a spliced joint is to be made. The ends may be finished off with a sharp carpenter's block plane and then scraped to a smooth surface, with the edge of a piece of glass.

A Simple Combination-Lever Hoist

A handy homemade chain hoist may be made of a discarded automobile driving chain, or other link chain of this type, by rigging it with suitable levers to work in combination. The



This Hoist was Made of a Discarded Automobile Drive Chain Fitted with Hooks and Levers Forged from Scrap Pieces of Wrought Iron

hoist shown in the sketch was constructed with such a chain and other fittings made of scrap metal in the machine shop. The device is easy to operate and handles a considerable load, depending on the strength of the chain and other parts used, as well as the force applied by the operator.

The parts are shown in detail in the sketches at the right. Their dimensions may be worked out to suit the individual requirements and are only for the construction of the particular hoist shown, which had a chain 1⅛ in. wide and 1⅛ in. from center to center of the pivot pins in the links, as indicated in the detail drawing of the chain. The arrangement and proportion of the levers must be worked out carefully for the particular chain used, and the longer the power arm A the greater the power to be derived, providing the lever is used to its fullest extent.

The illustration at the left shows the device in operation. When pressure is applied on the lever, or handle, A, with the hooks C and D in the position indicated, a pivoting action on the lower end of the hook C brings the power arm to the position B. The lever hook D is carried upward, bringing the hook E, to which the weight is attached, with it. The hook on the end of D then engages the next higher link in the chain. The lever arm A is now lifted, which causes the pivoting action to take place at the lower end of the hook D; the hook C is carried upward and engages a new link. This process is repeated, the load at E being raised gradually, as with a differential hoist.

The levers and hooks are made of strips of wrought iron. The arm is 26 in. long and the holes bored in it are spaced carefully to fit the action of the lever arm and connecting parts, in operation. The spacing of the three holes indicated is determined in part by the size of the chain, and it is advisable to make a full-size diagram of the arrangement of the working parts, similar to the sketch at the left, and to test the operation by marking the path of the levers and hooks in engaging the chain. The hook C is 11⅝ in. long and provided with a fork at one end to fit over the lever arm at its pivot. The hook D is 5½ in. long and similarly fitted. The curved ends of the hooks must be made carefully and may require adjustment to make them operate smoothly in the links of the chain, and still retain their grip.—Paul A. Baumeister, Flushing, N. Y.

Bit Brace Used on Chuck Wrench

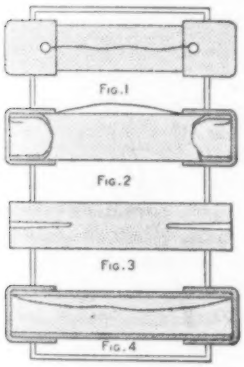
In operating the chuck on a bench lathe it was found that it took a good deal of time to change the jaws or to adjust them to the size of various pieces of work, when this was done by hand with an ordinary socket wrench. By placing the wrench in a brace it is gripped firmly by the small rod, which is provided as a handle, and much time may be saved in adjusting the jaws.—O. N. Webb, Nashville, Tennessee.

¶To place a valve in the line between the gasoline tank and the carburetor in a concealed place, will often prevent the theft of a car.

Renewing Cartridge Fuses

While cartridge fuses are convenient, they are expensive when burned out frequently, as is the case where experimental work is going on. When the wall cabinet is made for this form of fuse, it is impracticable to use the plain fuse wire or the screw-plug fuse to save the expense of frequent renewals, or even for emergencies. As the cartridge fuse is rapidly coming into general use, the following suggestions for renewing these fuses may be of interest.

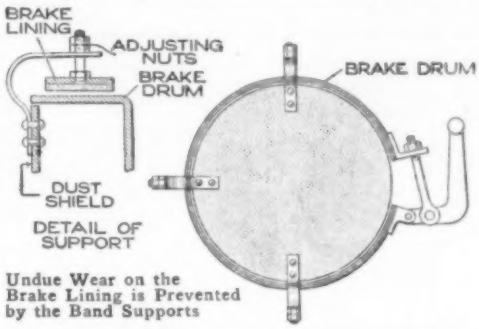
In one form of cartridge fuse each of the brass end caps is held on by a small brass nail. To renew these, it is necessary only to pry up the nails a little, wrap the ends of a short piece of fuse wire around them and drive them in again, as illustrated in Fig. 1. If no fuse wire is at hand, a single strand of wire taken from a piece of drop cord will make a safe fuse, for a load of about 15 lamps. In using such a substitute too strong a fuse wire must not be provided, otherwise its failure to melt under an overload may endanger the wiring.



In the other form of cartridge fuse, the brass end caps are held on by deep punch marks. The caps may be pulled off easily by using the vise to hold one cap while the other is removed with a hammer and pliers. Take off both caps and file a slot in the fiber tube for about ½ in. at each end, Fig. 3, so that when a piece of fuse wire is laid along the tube and bent over at each end, the caps may be pushed on again and thus make a good connection, as in Fig. 2. When fine copper wire is used, it is not necessary to file the slots, and the wire may be placed inside, as in Fig. 4.

Adjustable Brake-Band Support

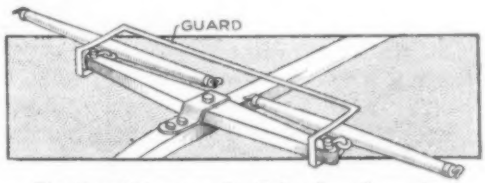
Dragging of the external brake bands on an automobile or motorcycle absorbs power that should be applied to the wheels, and causes overheating of the motor. Brake-band supports are not provided on many older cars. The device shown in the illustration has proven satisfactory for this purpose and can be made in the home shop. It consists of a flat spring having one end riveted to the brake dust shield, and the other drilled to fit a screw which is fastened to the brake band. The hole in the spring should be slightly larger than the screw. Adjustment is made with the nuts on the end of the screw, the second one being a locknut. Three springs will give proper support for the band.



Undue Wear on the Brake Lining is Prevented by the Band Supports

Guard to Prevent Entangling of Reins

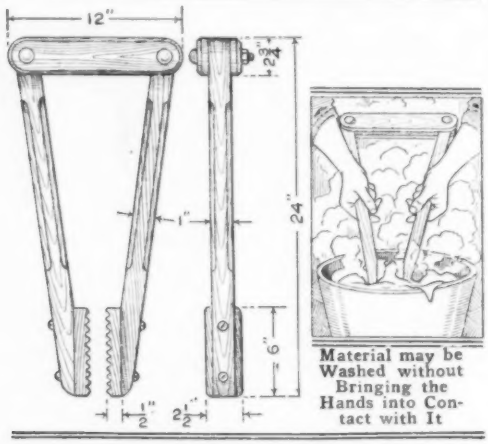
A guard that will overcome the annoyance and possible danger of the horses' reins becoming entangled in the draft rigging of a vehicle is shown in the sketch. It consists of an iron rod, fixed at either end to the lower side of the doubletree and shaped to prevent the reins from dropping under the ends of the singletrees.



The Guard Prevents the Reins from becoming Entangled in the Draft Rigging

Sanitary Clothes Washer

Often it is desired to wash clothing, or other articles, without bringing the hands into contact with the material, which may be infected. The sketch



shows a simple device that makes it unnecessary to use the hands directly in rubbing the cloth or other material. The washer is provided with two brushlike blocks on the lower end, by which the material is gripped. The upper joints of the frame are pivoted so that a free action of the brushes is permitted.—A. S. Thomas, Amherstburg, Ontario, Can.

Washer Makes Broken Spring Usable

The automobilist as well as the general mechanic will appreciate a kink by which broken valve springs, or other helical springs, may be used temporarily. A simple expedient by which a car was driven 40 miles without further trouble after a valve spring broke, was the insertion of a washer at the broken place in the spring. The two parts acted as two separate springs since the broken ends engaged the washer.—H. S. Wayne.

¶Windows in uncompleted buildings are whitened not only to prevent persons from looking in but also to prevent workmen from breaking the otherwise nearly invisible panes.

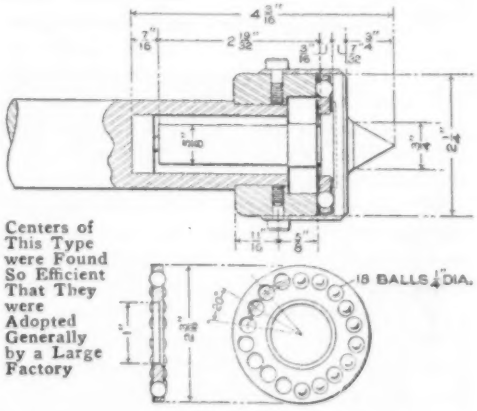
Cover for Mortar

When using a mortar and pestle for crushing hard substances there is a risk that some of the powder may be lost or possibly get into one's eyes. A good precautionary measure is to provide a disk of thick paper or cardboard to fit around the pestle. After the preliminary crushing the cover may be removed and the grinding continued in safety.

Ball-Bearing Tailstock Center

Working details of a ball-bearing tailstock center, which overcomes the objections to the ordinary dead center in an engine lathe, are shown in the illustration. Particularly when high-speed steel cutting tools are used and work is being rushed the common type of centers are often burned, causing delay and expense. The centers must be annealed, ground, or otherwise repaired frequently.

The center shown is fitted into the spindle of the tailstock, which is bored out to receive it. The thrust against the center is carried on the ball bearings, which operate in a ring, shown in



the lower sketch. This method gives the necessary freedom of action, and has been found to give such good results that in a large factory all of the manufacturing lathes are being fitted with centers of this type.—George P. Breitschmid, Arlington, R. I.

Eliminating Rattle of an Automobile Radiator

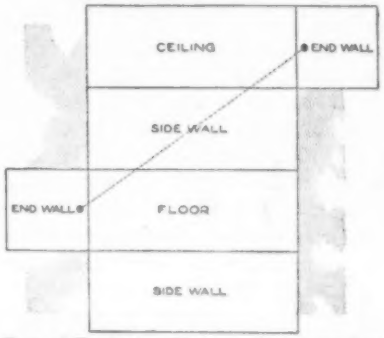
The radiator on an automobile truck was suspended by a hinge on each side made of two spiral-shaped pieces of spring steel. A space of approximately ½ in. had been provided between the lower edge of the radiator and the top flange of the front cross member, for the purpose of allowing the radiator a free up-and-down movement as the truck traveled over the irregularities encountered on the road. This often resulted in an almost continuous rattle whenever the radiator touched the cross member. To eliminate this noise a strip of rubber was inserted beneath the radiator and on top of the cross member. This acted as a shock absorber, and the trouble ceased.—Adolph Kline, New York City.

Economy in Platinum or Other Wiring

An electrical contractor doing some inside wiring, whose specifications called for the use of expensive platinum wire, was confronted with the following seemingly simple problem:

The laboratory in which the work was to be done was 30 ft. long, 12 ft. high, and 12 ft. wide. The strand of wire was to be carried from a point 1 ft. from the floor in the center of the end wall to a binding post 1 ft. below the ceiling in the exact center of the wall at the opposite end of the room. Under no circumstances could the wire be strung in the air between any two points. It had to be attached to a surface the entire distance—floor, walls, or ceiling.

To carry the wire down along the floor and then up the end wall he quickly calculated would require 42 ft. To go upward and across the ceiling would take just the same amount, and to follow the top of the baseboard around the side wall, and then up, would require more. So the contractor put in a requisition for 42 ft. of platinum wire, but the architects in charge of the work returned the requisition on the ground that he was using too much material for the required distance. They sketched the laboratory walls, floor, and ceiling in a layout, as shown in the illustration, and then drew a



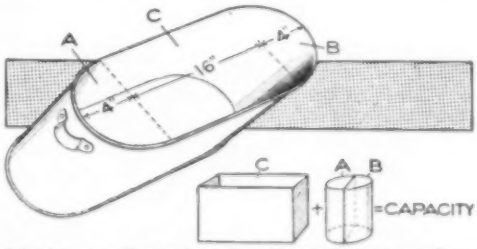
Two Feet of Expensive Platinum Wire was Saved by Making a Diagram to Determine the Best Method of Wiring

straight line between the two points. The distance was 40 feet.

An interesting feature of the problem is that in the architects' solution the contractor loses a foot at the outset by going down to the floor, and seemingly loses another when he carries the wire to the ceiling, which is a foot higher than his destination.—S. Dike Hooper, Eugene, Ore.

Finding the Capacity of a Wash Boiler

When asked to find the capacity of an ordinary wash boiler I found that the quickest and easiest way to solve the problem was to divide it into two figures—a box and a cylinder—find the



Dividing the Boiler into Two Parts Makes It an Easy Problem to Find the Capacity

cubical content of each, and add them together. The boiler is composed of the two ends A and B, making up the cylinder, plus the box C, which is the portion remaining.—James M. Kane, Doylestown, Pa.

A Farm Seed-Corn House

By E. L. Forrest

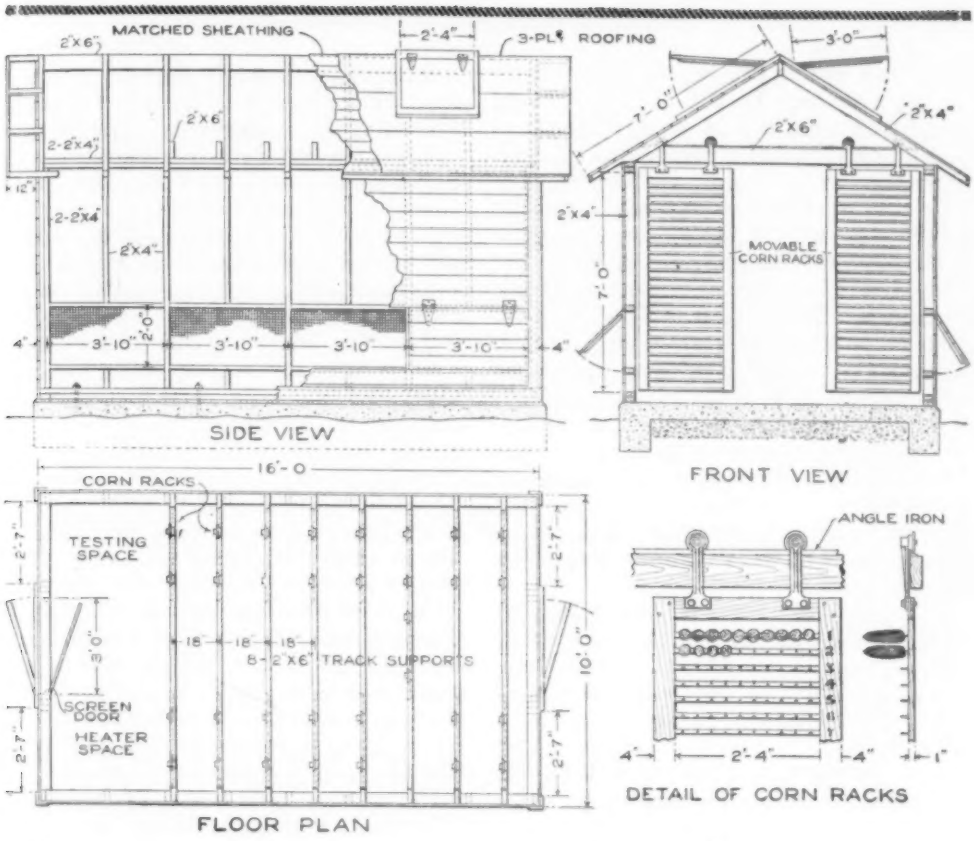
SELECTION of corn seed on a scientific basis is a generally recognized practice in corn raising and has proved its value. Carefully designed equipment is used by farmers who specialize in producing seed corn, particularly for the care and storage of the seed. Many farmers who do not make a business of seed-corn raising, but who require a considerable quantity of seed, will profit by the adoption of scientific methods in the care and selection of their seed, and a requisite is a properly constructed and ventilated storage house, where the corn may be tested, graded, and dried. In a number of farm communities several enterprising corn growers have joined in the building of a seed-corn house, and supply their neighbors with good seed. The details of such a house, that will care for about 90 bu., are shown in the upper sketches and below is a view of the exterior. It is 10 ft. wide, 16 ft. long, and 11 ft. high over all. The corn on the cob is placed on racks which are suspended from rafters by roller hangers. Space is provided for the testing of the corn and also for an oil stove, or other heater. Ventilation is afforded by the screened openings, covered with hinged doors and extending around the base of the house. Screened ventilating openings are also built into the roof.

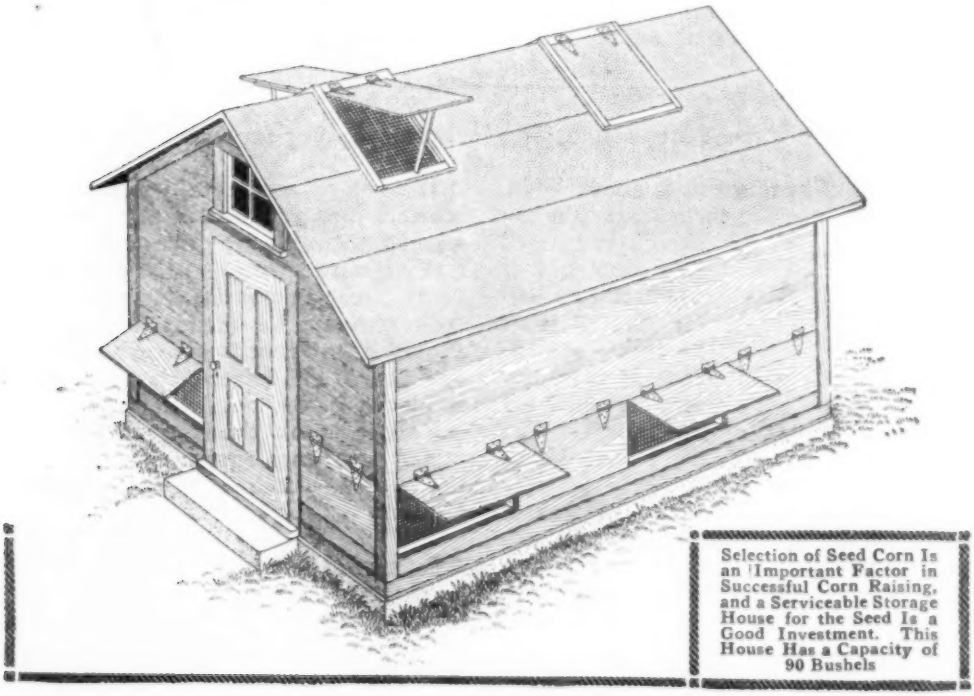
The foundation is of concrete and designed to form a level surface with the floor. A mixture of one part of cement to three parts of clean, coarse sand, and six of crushed rock or gravel is suitable for the purpose. If the rectangular foundation is dug carefully to a depth of 12 in., only narrow guide boards need be used for the exposed edges of the floor surface. The guide boards must be leveled carefully so that the floor will be level. The exposed surfaces of the floor and foundation should be finished with a mixture of sand and cement, and troweled smooth. The house is anchored to the foundation by bolts, which are set into the concrete and bolted through the two 2 by 4-in. pieces forming the sill. The studding for the sides and ends are cut 7 ft. long, as shown in the front view. Double 2 by 4-in. pieces are used for the plate, which holds the studding at their upper ends. The rafters are of 2 by 4-in. stuff, cut 7 ft. long and matched to the proper pitch. Lookouts of 2 by 2-in. stock are placed at the ends of the roof to support the 12-in. overhang.

The details of the side framing are shown in the side view. Double studs are placed at the corners, and the studding is set on 23-in. centers. The weight is carried largely by the uprights which extend to the sill, as the intermediate studs are fitted to cross-pieces forming the upper sides of the ventilating-screen openings. The double plate is of sufficient strength so that this construction will carry the load satisfactorily. In regions where heavy snowfall makes the roof load considerable, or where, for any reason, extra strength is desired, it would be well to extend all the studs from the sill to the plate, and make ventilating openings between the studding.

The rafters are of 2 by 4-in. stuff and long enough to give wide eaves, affording the necessary protection to the ventilating openings. The openings in the roof are placed between two pairs of rafters and the hinged covers are fitted carefully, to make them weather-tight. The roof is covered with ship-lap boards, 6 in. wide, over which a composition roof is nailed. The joints in the roofing material may be run either vertically or horizontally, care being taken in either case to make proper laps and tight joints.

The sides are covered with matched siding, trimmed suitably at the cor-





Selection of Seed Corn Is an Important Factor in Successful Corn Raising, and a Serviceable Storage House for the Seed Is a Good Investment. This House Has a Capacity of 90 Bushels

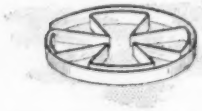
ners and under the eaves. The ventilating openings in the sides and ends are fitted with a 2-in. casing strip extending around the four sides of each opening. The doors, or covers, are made of matched siding held together by cleats, and are hinged on T-hinges. The 2-in. casing provides a jamb for the covers on the outer edge of the openings. Wire mesh is fitted against the inner edge of the casing, and a 1-in. strip is nailed around the edge of the opening to hold the wire in place. The door may be of the stock variety or built up of matched stuff, cleated together. A screen door is hinged to swing into the house, so that the door may also be left open for ventilation. Small windows are fitted into the gable at each end.

The track supports for the racks are of 2 by 6-in. stuff, set on edge upon the plates. They are set on 18-in. centers, as shown in the floor plan, and provide for 16 racks, two on each track. The racks are suspended on heavy roller hangers so that they may be shifted for filling or examination. They consist of frames of 1-in. strips, 4 in. wide, and are 7 ft. long and 3 ft. wide. The corn on the cob is supported by 2-in. strips through which 10-penny nails are driven, as shown in the detail sketch of the corn racks. The rows of cobs are numbered so that they may be classified or identified after being stored. In loading the racks they are moved to the 3-ft. passage in the center of the house and the cobs forced onto the nails, after which the racks are returned to their places. The numbering on the racks should be placed so that it is easily visible from the passage, and the individual racks should also be numbered.

The fundamental design described may be applied to a smaller or a larger seed-corn house. The movable-rack arrangement is convenient for a smaller house, and the testing and heater spaces are also desirable. It would be well, therefore, to shorten the length of the house at the rear, under these conditions. For a larger house the same width might be maintained and the house extended, as required, at the rear. Double rows of racks might be installed, and, if the load became too great to be supported as in the house described, the racks could be rested on the floor and made to slide on a track, with guides at their tops.

Cross Disk on Faucet Stops Splashing

A piece of spring brass, about ¼ in. wide, bent into the form shown in the sketch and fitted to a faucet, will prevent the water issuing from it from splashing. The strip of brass is carefully bent to shape with pliers and inserted into the opening of the faucet. The diameter of the device, before being inserted, should be slightly greater than that of the opening, so that it will remain in place. High-pressure nozzles used by firemen are fitted with devices designed on this principle, and break up the stream of water so that one man can handle a hose that could not be handled otherwise by two men.



Safety Spring for Gas-Stove Burner

Danger of accidentally opening the burners on gas stoves by brushing against them may be overcome by attaching wire springs to the pipe which feeds the gas to the burners. The springs may be made of wire and should have about two coils around the feed pipe. The lower end of the spring is placed in contact with the front of the stove, below the feed pipe, and the upper end bears against the handle of the valve.—LeRoy Shenck, Mount Vernon, N. Y.

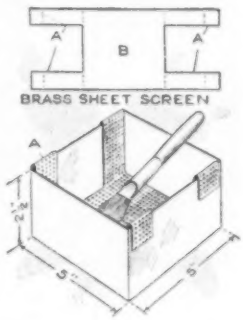
¶Seams in concrete pavements are often run diagonally in order to prevent wear at the corners of the joints, which is severe if wagon wheels strike the edges.

Starting Large Gas Engines

By priming with ether instead of with gasoline it is possible to start heavy motors on the first quarter-turn. The ether should be used sparingly and in the usual manner. This method was employed with success on the engine of a large truck that would not start by spinning it.—Thomas W. Benson, Hastings-on-Hudson, N. Y.

Oil Tray for Screw Cutting

When considerable screw cutting is to be done in a lathe the oil tray shown in the sketch will be found convenient as an aid to first-class work. The box may be made of sheet metal, of a suitable size as indicated, or may be obtained from another source. It is fitted with a screen of sheet brass, cut to the shape indicated in the diagram and folded at A so that the portion B forms the bottom. The screen is suspended in the tray and catches the cuttings. The tray is partly filled with oil and rests on the lathe carriage when in use. The brush is convenient in applying the oil. When the job is completed, the screen may be lifted from the tray, thus removing the cuttings and permitting the use of the oil for other jobs. If much work of this kind is handled, the saving of the cuttings may be a worth-while item.



Paraffin Automobile Polish

Paraffin oil, diluted with alcohol and used as a spray, is an excellent polish for automobile bodies. The car is rubbed down with clean cheesecloth to a brilliant polish. The paraffin oil thus used will remove dust and mud spots, and is a clean method of polishing.—W. B. Johnson, Los Angeles, California.

A Clothesline Post

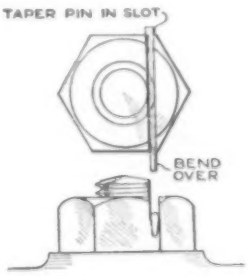
A serviceable clothesline post was made out of an old boiler tube and a discarded wagon hub, as shown in the sketch. The boiler tube was cut to a length of 8½ ft. and sunk into the ground so that 6½ ft. was exposed. Sections of gas pipe were placed at right angles through the hub and the latter fitted snugly into the top of the boiler tube. The construction was given several coats of paint and withstood hard wear in the open. By using wooden plugs in the ends of the pipes and boring suitable holes through them, the old boiler tubes may be used to build a substantial railing or fence.

Twisting Wire with a Brace

Having two long single strands of electric-lamp cord, which it was desired to twist together, I fastened two of the ends to a hook and put the other two ends in the chuck of a brace. By turning the brace I was able to twist the wires together quickly and neatly.—Joseph Purdy, Chicago, Ill.

Quickly Made Locknut

A device that locks machine nuts securely without the use of a jam nut is shown in the sketch. A slot is sawed at the edge of the threaded hole in the nut and after the latter is fixed into place a taper pin is driven into it. The end is bent over to insure that the wedge remains in place. This method permits of removing the nut when necessary, yet insures a positive grip.



An Indicator and Tool Holder

The illustration shows two devices which may be made by the machinist

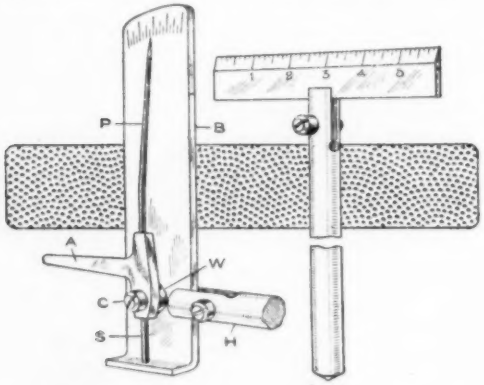


FIG. 1 FIG. 2

The Indicator and Tool Holder Are Simple in Construction and Have a Variety of Uses in the Machine Shop

or tool maker, and which will appeal to mechanics by reason of their simplicity and usefulness. At the left is shown an indicator with a holder to be set in the tool post of a lathe, and at the right is a similar holder attached temporarily to a scale, for use in places where the hand cannot conveniently reach.

The indicator consists of a steel plate, B, bent into the form of a bracket. The contact leg A is a piece of hardened steel, hinged on a shoulder screw, C, and the end of its long arm is the part used in contact with the work when indicated. A washer, W, is placed between the bracket and the contact leg. Since the shoulder screw is below the center line of the contact leg, a slight deflection will give the indicating needle P a considerable movement. A piece of spring wire, S, is sweated into the lower end of the contact leg and fixed to the lower end of the bracket. It returns the needle to the zero point when the contact leg is freed.

The clamp arm H is used to hold the indicator in the tool post, and in Fig. 2 it is shown attached to a scale. The holder consists of a slotted arm clamped at the end with a cap screw. —W. Burr Bennett, Bridgeport, Conn.

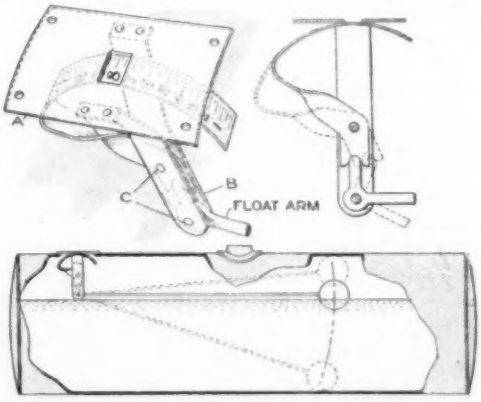
Auxiliary Grip for Valve Handle

It is sometimes extremely difficult to open a small-wheel valve, especially when the handle is oily or greasy. An aid in getting a good grip is to thread a piece of covered copper wire through the spokes and around the rim of the wheel. This enables one to grasp the wheel firmly regardless of grease on the wheel or the hands.

Automatic Gasoline-Supply Indicator

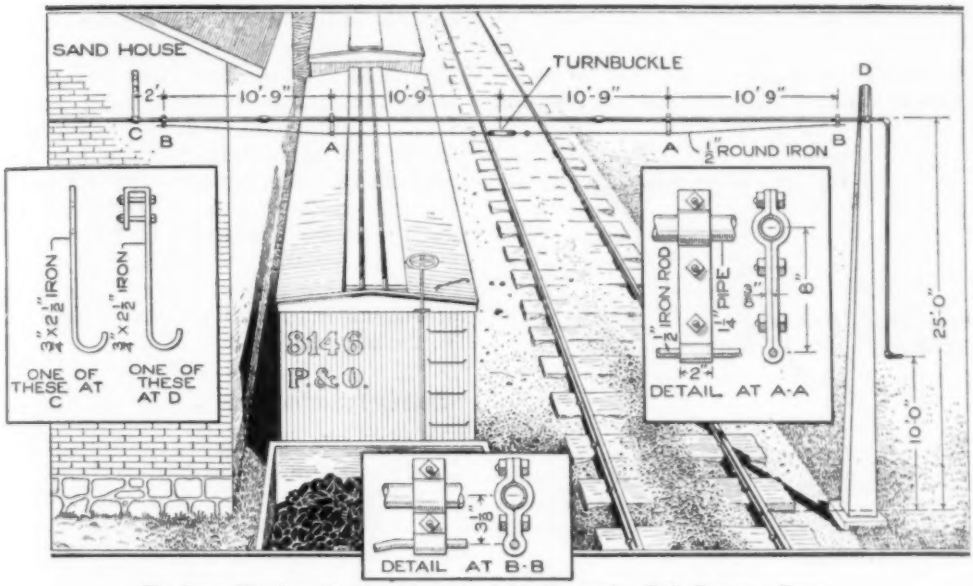
The depth of gasoline in an automobile tank or other container of liquid is indicated by the use of the device shown in the illustration. It consists of a hollow metal float fixed to an arm which actuates a lever, one end of which is marked with indications. The latter appear through a slot, as shown, and may be read conveniently.

The device is fixed to the tank at a place where the indicator may be examined, and is supported on a brass plate, A. Attached to the plate are two braces, B, which carry the indicating lever, and the bearing pins C. The diagram at the right shows the shape and arrangement of the lever. The brass plate should be large enough so that the float may be inserted through



The Device Automatically Indicates the Amount of Gasoline or Other Liquid in the Tank

the opening, and a gasket, or packing, should be placed around its edge, to form a tight joint. The indications on the dial strip may be marked by pour-



The Strut Fixed to the Pipe Resting on the Supporting Pole Forms a Truss

ing known quantities of liquid into the tank and making marks on the strip at the proper points.

Forge Fire Adapted for Heating Soldering Iron

A forge fire of considerable size is not well suited to the proper heating of a soldering iron, or other small pieces of metal. By placing a piece of pipe in the center of the fire and banking the coals around it, a convenient place, into which the soldering iron may be inserted, is provided. This also prevents unnecessary wear by the burning of the iron in contact with the fire. For heating small pieces of steel, to be tempered, this kink is also useful.—J. Harger, Honolulu, H. I.

When filing thin spindles in a lathe, hold two fine files to the surface, one above and one below the spindle, thus bracing it.

Truss for Long Span of Pipe

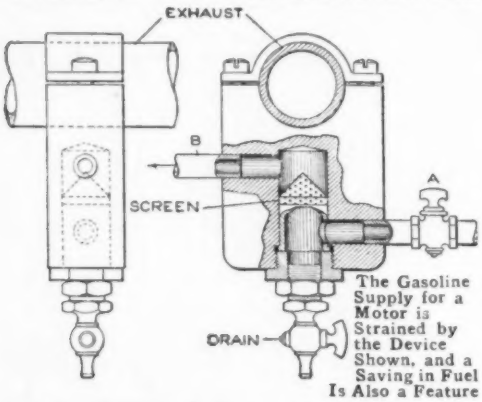
Supporting long spans of pipe, particularly at considerable heights, is often difficult. The method shown in the sketch proved effective under severe conditions and may be applied in a large variety of situations.

The arrangement was designed to give a clear way 25 ft. above the outbound railroad tracks adjoining a shop. It was unsafe to place a support between the tracks, hence it was built as shown at the right and a strut fixed to the pipe, which carried steam. The fixtures shown in the detail sketches give a positive grip on the pipe and strut rod. They may be constructed readily of band iron, drilled and bolted together.—S. O. Benjamin, Washington, Ind.

Gasoline Fuel Strainer and Economizer

A fuel strainer and gasoline saver is an unusual combination; the sketch shows a simple, practical device combining these features. It consists of a piece of cast iron or steel fitted to the exhaust pipe with a split cap and machine screws. The gasoline pipe from the supply tank is connected to the

metal block at the shut-off valve A and the gasoline passes up through the cone-shaped screen and out at B to the carburetor. The accumulated dirt and



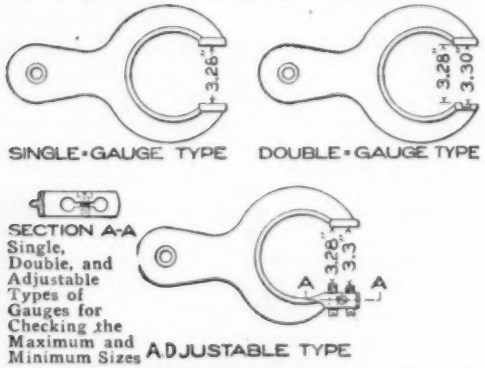
The Gasoline Supply for a Motor is Strained by the Device Shown, and a Saving in Fuel Is Also a Feature

water screened from the gasoline is drained off at the stopcock.

Since the block is clamped tightly to the exhaust pipe, it absorbs heat from it and the temperature of the gasoline is thus raised in passing through. For this reason the fuel will vaporize more readily in the carburetor and a weaker mixture will serve the motor. Less gasoline will thus be used. The block should be in contact with the exhaust pipe for a distance of not more than 2 in., if it is made wider in the lower portion than at the cap.

Snap Gauges

In the manufacture of duplicate machine parts, snap gauges are used to

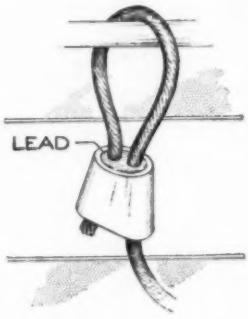


Single, Double, and Adjustable Types of Gauges for Checking the Maximum and Minimum Sizes

check the maximum and minimum sizes. In most factories two gauges are used, a maximum and a minimum, each a separate gauge. There is now made a gauge that is a combination of the two, having the rear gauge the minimum, and the maximum at the front. These gauges are subject to wear, and if hardened, they must be annealed to take up the wear by drawing the ends together. I designed a gauge, as shown, which is adjustable, having only one jaw hardened and two hardened setscrews. These may be set at any time to take up the wear.—Joe V. Romig, Allentown, Pa.

Leaded Socket for Cable Fastening

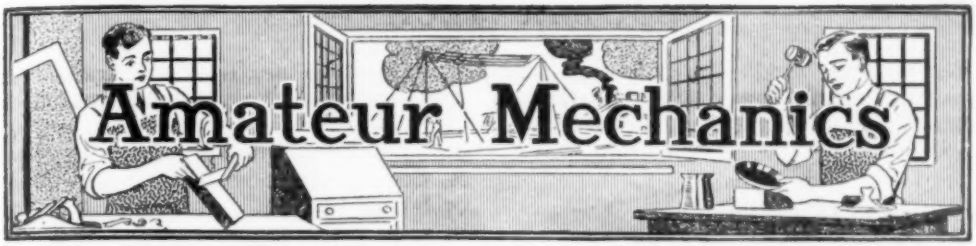
Loop ends of cable must be securely fastened to insure safety, and the device shown in the sketch will provide such a fastening. A section of pipe was flattened at one end and the cable inserted as shown. Molten lead was poured into the pipe, fixing the loop firmly. The socket was arranged so that the larger end of the pipe is farthest from the loop. The pull on the loop thus tends to force the wedge-shaped lead filling more firmly into its casing.



Improving a Razor Strop

To improve the sharpening qualities of a razor strop obtain a strip of soft, smooth lead. Apply a good lather to the strop, both on the canvas and leather sides. Rub the lead over the strop as in stropping a razor until the lather has disappeared. The lead acts as a lubricant and in fine particles gives an excellent honing surface.—L. E. Fetter, Portsmouth, N. H.

¶In distributing hand-set type after use, printers moisten the batch to be "thrown in," so that the "take," or quantity of type taken in the hand at one time, will cling together.



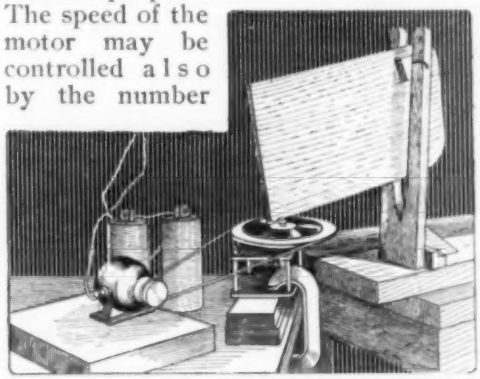
Talking Machine Made of a Shingle and a Pin

By HARRY L. WHITE

WHILE successful competition with the many fine talking machines now available can hardly be expected of the simple arrangement illustrated, those who have not heard records played on it will be astonished at the results. Engineering students devised the machine from materials at hand in the laboratory and afforded visitors to an exhibition much amusement. A shingle suspended on a crude support, and carrying a pin at its lower end, where contact is made with the record, forms the distinguishing feature. The records are carried by a pulley wheel, which is belted to a motor. The device is particularly interesting for experimentation, as a variety of results may be obtained by changing speeds and methods of attaching the shingle. The pin may be made of various substances. An ordinary pin, metal, wooden, or reed needles, and even thorns may be used. By reversing the direction of the rotary movement of the record, startling and often ludicrous sounds are produced, calling to mind the merriment caused by the reversing of motion-picture films when that was a diversion.

The arrangement in its simplest form is shown in the illustration. The construction of a compact machine, made on the original principle, and of simple materials, is shown in Fig. 1. Several experimental methods of suspending the shingle are shown in Fig. 2, and the details of the shingle support, in Fig. 3.

The speed of the records may be varied, but normally they should run at 80 revolutions a minute. In order to maintain this speed the motor, which provides the power, must be geared down. This may be accomplished by the use of belting and pulleys of suitable size. The sketch shows the use of round belting, which is satisfactory for this purpose. The speed of the motor may be controlled also by the number of cells used to furnish the current or by passing the current through a rheostat. Small motors usually run at a high speed. It is not feasible to set standard speeds for motors of different sizes, and the problem of adjusting the speed properly is one that affords opportunity for experimentation which should prove interesting and practical for amateurs in power transmission.



The Distinguishing Feature of This Simple Talking Machine Is the Shingle-and-Pin Device by Which the Record is Reproduced and Transmitted to the Auditors. It was Made of Pick-Up Material and Afforded Visitors to a School Exhibition Much Amusement

The illustration of the talking machine in its simplest form shows the use of a slow-speed ¼-hp. motor belted directly to a large pulley. A motor of this type is not ordinarily available to the home mechanic, hence it may be necessary to use a double set of reducing pulleys, as shown in the more compact arrangement in Fig. 1. To set forth in detail the sizes of

the pulleys used would be of little value, since the speed of the particular motor is fundamental. Each pulley

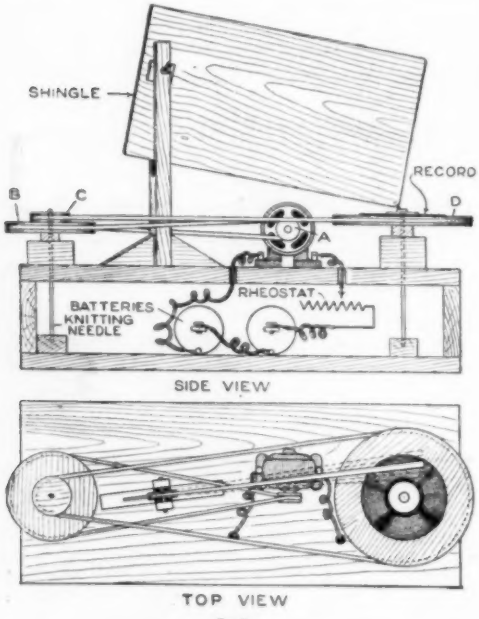


Fig. 1

This Arrangement Brings the Talking Machine into a Compact Form by the Use of Simple Materials, Readily Available to the Amateur. The Pulleys Transmit the Power from the Motor, Reducing the Speed from 2,000 to 80 Revolutions per Minute as Required on the Record Shaft

series would thus vary with the speed of the motor and the size of the driving pulley on the armature. For the purposes of this description, therefore, the general principle of power transmission by pulleys, as to their size and speed, will be discussed, as applied to the series used in Fig. 1. The determining of the sizes and speeds for various other pulley arrangements is simple, once the method is understood. Their relations may be determined by mathematical formulas. To simplify the process, it is best to assume certain relations of the pulleys and after working out the speeds, make the necessary adjustments. Suppose, for example, that the motor speed is 2,000 R.P.M. (revolutions per minute) under average load, which is common in small battery motors; and that the speed desired on the record is 80 R.P.M. Suppose, further, that a 1-in. pulley, A, is fitted on the armature shaft, which travels at 2,000 R.P.M. The pulley B, geared to A, will travel a greater or smaller number of revolutions per minute than A, depending on whether it is smaller or larger than A. Since it is the aim to reduce the speed, suppose that the pulley B is 5 in. in diameter. The calculation of the number of R.P.M. of B is as follows: R.P.M. of B equals diameter of A (1 in.) multiplied by R.P.M. of A (2,000), and this result divided by the diameter of B (5 in.), or 2,000 divided by 5; making the speed of B 400 R.P.M. It is evident that to reduce the speed of B (400 R.P.M.) to 80 R.P.M. on the record shaft would require the pulley D on the latter to be very large. It becomes necessary then to place a small pulley on the shaft at B. Suppose that its diameter is 2 in. Being on the same shaft as B, its speed is 400 R.P.M. The calculation varies slightly from that for pulleys A and B, since in this instance the speed of the driving pulley C and that of the driven pulley D are both known. It is as follows: The diameter of pulley D equals the R.P.M. of pulley C (400) multiplied by the diameter of pulley C (2 in.), and this result divided by the R.P.M. of pulley D (80), or 800 divided by 80; making

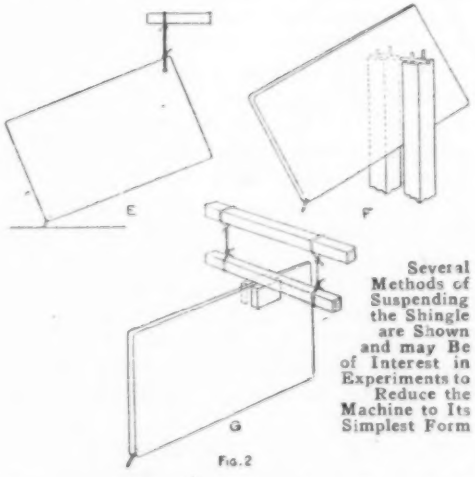


Fig. 2

Several Methods of Suspending the Shingle are Shown and may Be of Interest in Experiments to Reduce the Machine to Its Simplest Form

the required diameter of pulley D 10 in. There is a possibility for considerable variation in the size of the pul-

leys used to produce the same final speed on the pulley D. The complete formulas for calculating the diameters and other factors in pulley arrangements may be found in mechanical handbooks and may be of interest to those familiar with simple equations.

The box to house the batteries and to support the apparatus may be made of ½ or ¾-in. wood. It should be about 6 in. high, 12 in. wide, and 26 in. long. Knitting needles, fixed into blocks so that the pulleys revolve on them, are used as shafts. Several-ply wood is best for the pulleys, as it will not warp. A chain drive may be used instead of the round leather belt. A simple way to arrange the pulleys for use with sprocket chain is to draw the chain taut around the pulley and drive suitable-sized staples into the circumference, so as to engage the openings in the links. If carefully done, this will provide driving mechanism that will not slip and will run smoothly.

For experimental purposes the various methods of suspending the shingle, as shown in Fig. 2, may be of interest. What is perhaps the simplest form that will give results is shown at E. The shingle is suspended from a wooden support by a string. The use of a needle or thin nail, bearing on two square wooden rods as supports, is shown at F. A method that was found quite satisfactory is shown at G. The shingle is attached to the lower rod by means of two small blocks glued to it. The double-string suspension gives freedom of movement with a slight tension that assures stability in traveling over the record.

The method of suspending the shingle, as used in the arrangement shown in Fig. 1, is detailed in Fig. 3. Two small wooden blocks are fastened to the sides of the thin end of the shingle and a fine wire nail is driven through them, a hole being first bored to prevent splitting. The support is 13½ in. high and of 1-in. wood, braced at the lower end with triangular blocks. The wire nail which holds the shingle bears in a ½-in. hole which is slotted so that the shingle may be lifted out.

The needle is fixed into the end of the shingle by grasping it with pliers and forcing its blunt end into the wood. It must be set at the angle at which the

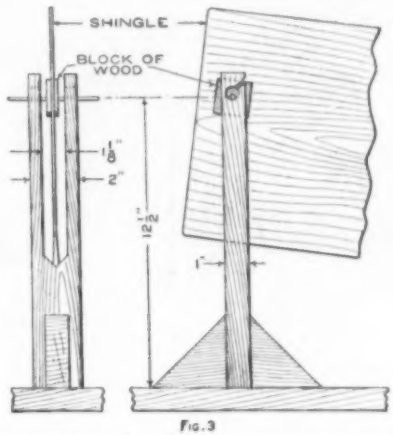


Fig. 3

A Wooden Post, Braced at the Base and Fitted with a Wire Nail as a Shaft, Supports the Shingle

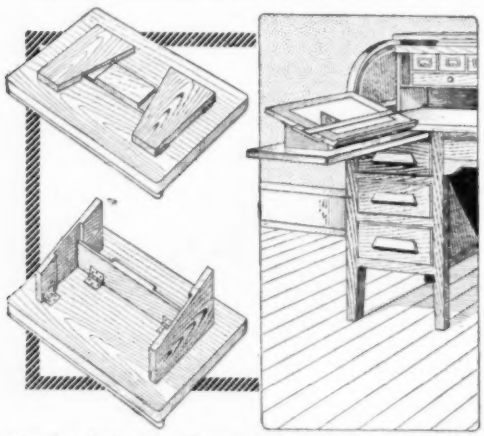
needle of a disk talking machine is set, to give the best results. Care must be taken that the various makeshift needles that are used are not injured in fixing them in place. The experiments with needles, as well as the first tests of the device, should be made with old or inexpensive records to avoid the possibility of damage to more valuable ones.

Small Folding Drawing Board and Stand

Persons who use roll-top desks find them inconvenient when it is desired to do designing or drafting occasionally. To overcome this, the small folding drawing board illustrated was made. When not in use it stands on edge on the floor in a narrow space between the desk and a filing cabinet. When drafting is to be done, the board is drawn out, and, in its open position, placed upon the sliding shelf of the desk, as shown in the sketch. This affords a working surface of the proper height and angle, with a ledge along the front, so that a triangle may be moved back and forth on it, instead of a T-square. Paper in sheets is more convenient than roll paper for use with

the device, as with the sheets no thumb tacks are needed.

The sketches at the left indicate the



The Small Drafting Board and Stand Is a Practical and Convenient Adjunct to a Roll-Top Desk, and Folds Compactly

method of construction. The dimensions may be varied to suit individual needs. The top should be made of three-ply stock so that it will not warp or twist. Round the corners slightly, and glue a strip of wood, ⅛ in. thick and ½ in. wide, at the lower edge of the board. The paper is placed against this edge to hold it steady. Two slanting supports are hinged to fold under the board. Portions cut away from their centers on the inner side, as shown in the sketch, permit the center brace to collapse. The whole construction may thus be folded into a comparatively flat parcel.

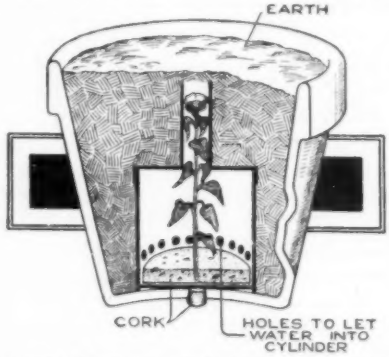
Nongreasy Transfer Paper for Finished Surfaces

Occasionally it is necessary to transfer letters or designs to a surface that has been painted or finished in a dark color. Ordinary transfer paper does not make impressions that show distinctly on such a surface, and the lines may be removed with difficulty. If a piece of paper is dusted over with whiting or powdered chalk and then used as a transfer paper the lines will appear in white. They may be erased easily, and the surplus whiting may be removed with a moist cloth.

The Magic Flowerpot

A favorite trick of the magicians is to plant a seed in a flowerpot, water it, say a few mysterious words, and apparently cause a plant to grow up before the spectators. This appears to be a wonderful trick but is actually quite simple. The sketch shows how the flowerpot is prepared and how the plant "grows" when watered.

The device is prepared as follows: A metal can, into which holes have been bored near the lower edge, is placed in the center of the flowerpot. At its upper end is a tube which is barely covered by the earth at the surface. A circular disk of cork is fitted in the can and attached to it is a rod bearing the flower. The hole in the bottom of the flowerpot is plugged tightly, and when water is poured into the pot it seeps through the dirt and enters the can by way of the holes. The cork disk rises as more water is added, carrying the flower upward



The Water Enters the Buried Can, Floating the Cork Disk and Causing the Flower to "Grow"

through the thin layer of dirt. This trick may be performed by the amateur in the home if the necessary device is made carefully.—Ed. Gettins, Los Angeles, Calif.

¶ Lumps of rock candy, placed between the jaws of a nutcracker and suddenly crushed in a dark room, will produce a flash bright enough to be seen at a distance. This is caused by a peculiar light produced when certain types of crystals are fractured.

Test Exposures for Bromide Enlargements

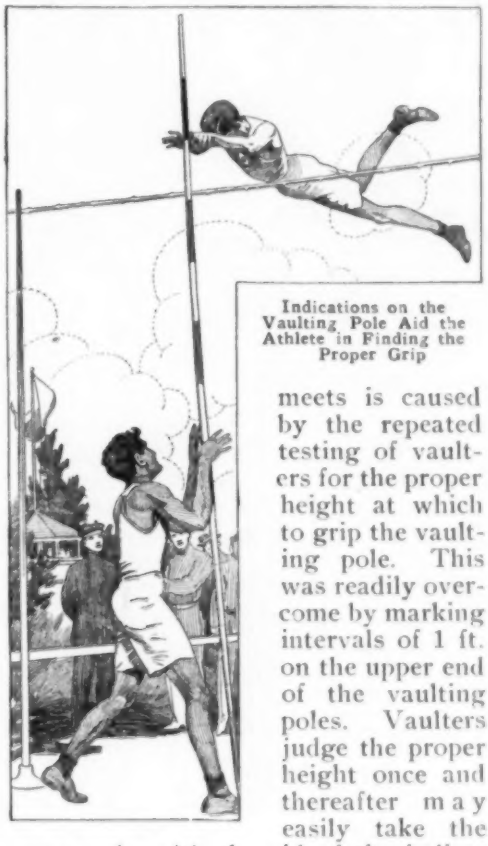
To avoid expensive waste of paper in making large bromide enlargements the following device is useful: Cut an oblong sheet of stiff cardboard, 5¼ by 4 in., with a central opening, measuring 3¾ by 1½ in. Along the lower edge of the central opening mark off five spaces of ¾ in. each, and number them from 1 to 5. Glue a strip of cardboard, 1 in. wide, at the top and the bottom of the oblong, on the back. Now glue a second strip of cardboard over each of those just attached, making the second strips slightly wider to form grooves similar to those in a sliding-top box.

Cut a piece of cardboard, wide enough to slide easily in these grooves, and about 7 in. long. In the center of it, cut an opening, 1½ in. long and ¾ in. wide, with the longer dimension extending across the strip. By inserting this slide into the grooves, the opening in it may be shifted to correspond to any of the five ¾-in. indications at the lower edge of the opening in the oblong frame.

Focus the enlargement on the easel and put the cap on the lens. Then pin a 1½-in. strip of bromide paper where a good range of detail will fall upon it. Pin the oblong card over the bromide strip and make five successive exposures, of increasing duration, by sliding the strip so that its opening is opposite the number indications on the oblong. Note the particulars of exposure at the time and later develop the strip of bromide paper. Suppose the exposures were of 8, 16, 24, 32, and 40 seconds' duration, and upon development it was found that the first and second exposures were much underexposed and that the fifth was overexposed; the third and fourth being only slightly under and overexposed, respectively. Then the mean of these two, that is 24 plus 32 divided by 2, or 28 seconds, will be approximately the correct exposure. The use of this device will effect a considerable saving. —H. J. Gray, Lewes, Sussex, England.

Scale on Vaulting Pole Indicates Points of Grip

Unnecessary delay in running off the pole-vaulting events at athletic



Indications on the Vaulting Pole Aid the Athlete in Finding the Proper Grip

meets is caused by the repeated testing of vaulters for the proper height at which to grip the vaulting pole. This was readily overcome by marking intervals of 1 ft. on the upper end of the vaulting poles. Vaulters judge the proper height once and thereafter may easily take the same grip with the aid of the indications on the pole.—A. B. Wegener, Madison, N. J.

Current of Canal Raises Irrigation Water

The current of a canal was utilized to raise water for irrigation purposes, and other uses, by means of the homemade device shown in the illustration. A large-size buggy wheel was set on an old axle, and extensions were fixed to eight of the spokes. Paddles, 9 by 18 in. in size, were secured to the extensions, and uniform-size tin cans were fixed to the paddles, as shown. The current revolved the wheel, carry-

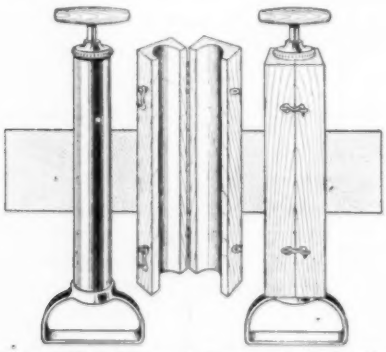
ing the loaded buckets upward, and the water was thus poured from them into a wide trough braced on the platform.

The Current of the Canal Causes the Wheel to Revolve, Carrying the Water to the Trough

A flume led the water to the irrigation ditches, and pipes were used to conduct some of it to the ranch house for general purposes. When the water is not desired for useful purposes the trough is withdrawn and the water drops into the canal.—Joseph Gray, Heber, Calif.

Protecting an Air Pump against Denting

The brass cylinders of many tire pumps are made of thin metal, and a



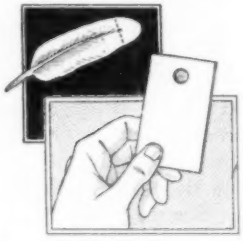
Denting of Tire Pumps is Prevented by the Use of a Case Like That Shown

slight blow may dent them. Such injuries interfere with the action of the plunger, making the pump almost useless. A case which will afford protection to the pump is shown in the sketch. It was made of two strips of wood cored out on the inner sides to fit the pump and provided with small hinges and hooks, to lock it into place.

A Feather as an X-Ray Lens

The outline of the bones in the hand may be seen by holding it before a strong light and looking through a lens made of a piece cut from the tip of a feather. The sketch shows such a lens, which is mounted in a small piece of cardboard that may be carried in the pocket, and which affords diversion wherever exhibited.

The device is made as follows: Procure a soft white feather from a fowl, and cut off the tip as indicated in the upper sketch. Cut a piece of cardboard, about 2 in. wide and 6 in. long. Fold it to form a folder, 3 in. long, and cut a hole, ¼ in. in diameter, through both parts of it. Glue the tip of the feather between the folder at the hole, taking care that the fibers lie flat and that no rib is exposed. Glue the edges of the folder, and the device is ready for use. Hold the hand, or other object, to be examined about 15 in. from the lens, and place the latter close to the eye. Looking through the hole toward an electric, or other strong, light, it will be observed that the bones of the hand, for example, may be seen clearly. They will be outlined with a band of varicolored light. A frosted globe is better than one which exposes a filament.—Leander L. Droesch Chickasaw, Ohio.



¶A safety-razor blade, fitted into a wooden handle, provides a convenient tool for ripping seams and cutting cardboard.

Bait Casting for Game Fish

by Stillman Taylor

THERE are many enjoyable phases of the fisher's art, but bait casting from the free reel probably has a wider appeal than any other branch of angling. The pleasure of handling a short bait-casting rod is in itself a good sport, even when casting done in the back yard is made for distance and accuracy only. Get two or three enthusiastic casters together, and you may have an interesting little tournament, held on a vacant lot, on the lake, or on the greensward of a city park. There is plenty of action in casting from the reel, and it is its variety that has made angling of this type so universally popular. True, considerable practice is required before the caster is able to shoot an accurate plug far off, but the knack may be gained after reasonable application. The handling of the short rod differs from all other angling methods —it is an active sport rather than a contemplative recreation—and when the fun of handling a good outfit is combined with the sport of coaxing out a black bass, shooting a wooden minnow among the lily pads for pickerel, or casting the bait for those pirates of our fresh-water lakes, the wall-eyed pike and the muskellunge, the angler gets a taste of fishing—plus.

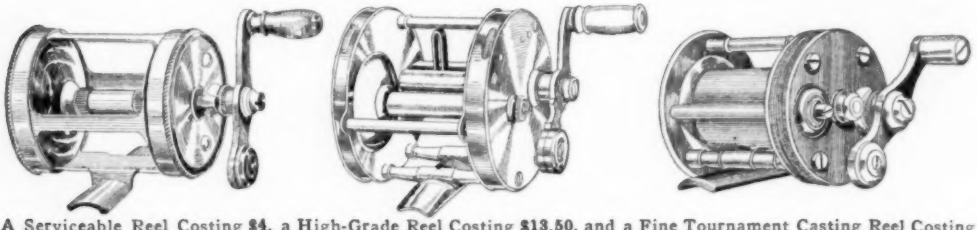
The Outfit and Its Selection

A good firearm is necessary to the good marksman and a well-made, nicely balanced rod, to which is clamped a smooth-running reel, is the essential equipment of an able angler. Bait casting is, of course, more a matter of skill than of outfit, but that is no reason why the angler should be handicapped by poor tackle, although large expenditure is not necessary in obtaining a satisfactory outfit. The casting rod may be from 5 to 6 ft. long. Where the caster regards length of cast as the important factor, the 5-ft. length will probably give the best satisfaction. However, the superiority of one over the other in this regard is rather to be found in the elasticity and quality of the rod than its length. The skill of the caster is, moreover, the ruling factor. The 5½-ft. rod is better than the 5-ft. length for fishing purposes, and the 6-ft. rod is more resilient than the 5½-ft. tip. If the greatest range is not of more importance than the landing of the fish, the longer rod will prove the most pleasant to handle.

The split-bamboo rod has many friends, and a well-made rod of this material is a thoroughly satisfactory casting tool. A fine-quality casting rod of split bamboo costs from $10 to $25. A fairly good rod may be bought for $2 or a trifle less, and a smooth-running reel for another $2, while a line for it will bring the total up to about $5. An outfit of this kind purchased with discrimination, while not embodying everything that a critical angler would desire, will cast a long and accurate line and stand up under the strain of handling our heaviest game fish. The one-piece rod is classed by many anglers as the ideal casting rod. The two-piece rod is handier to pack and is more generally used.

The chief fault in bait-casting rods is the stiff action of the tip section. For tournament casting, a fairly stiff rod is desirable. The same requirement

holds good for muskellunge and other heavy fishing. A flexible rod affords more pleasure in playing black bass and other active "gamey" fish. However, the best way to test out a rod is by casting with it.



A Serviceable Reel Costing $4, a High-Grade Reel Costing $13.50, and a Fine Tournament Casting Reel Costing $26, are Shown from Left to Right. The Center One Has a Level-Winding Device and a Thumb-Click Drag on the Rims of the Plates. The Tournament Casting Reel Has a Cork Arbor and Jeweled Bearings

The steel casting rod is well liked by some casters, but only a high-quality steel rod is worthy of consideration. It is generally not classed as the equal of a well-made solid-wood or split-bamboo rod, for casting. The better-grade steel rod is springy and flexible, and for this reason is a good rod for casting for black bass. Still, most anglers have a steel rod in their outfits, but it is not as generally used at tournaments as the time-tried wooden rod.

The guide is an important detail of a casting rod. Inexpensive rods are usually provided with large metal guides, while the better rods are fitted with agate guides, or with agate tip and hand guides. A guide, ½ in. in diameter, at the butt of the rod is large enough and will handle the line smoothly.

The single grip is sometimes preferred by casters, but the additional grip placed above the reel is desirable if much fishing is done. Solid-cork hand grasps are most satisfactory, being less slippery when wet and less tiring to the hand than handles made of other materials. If the lower grip is properly shaped with a forward edge, the forefinger will find a firm grip upon it, and the finger hook will not be needed. However, some anglers prefer to use the hook, and if the rod is not so fitted, a detachable hook may be fastened to it. A reel band that locks securely is desirable, and all the better grades of casting rods are so fitted.

The quadruple reel is the logical choice of the bait caster, the spool turning four times to one turn of the handle. As the work demanded of a bait-casting reel is different and more exacting than that of the click reel used in fly casting, its design is radically different. The best type of click reel is of large spool diameter and narrow between plates, while the typical casting reel is its direct opposite—being long-barreled, with plates of comparatively small diameter. For tournament casting the finest outfit will naturally be selected, but for practical work it is unnecessary to pay $25 for a finely wrought reel. Three typical reels are shown in the illustration. The one at the left holds 80 yd. of line, can be easily taken apart for cleaning, and costs $4. In the center is a level-winding reel with thumb click and adjustable drag placed on the rims of the plates. It holds 60 yd. of line, and costs $13.50. At the right is a very high-grade reel for tournament casting. It has a cork arbor, jeweled bearings, holds 60 yd. of line, and costs $26.

Any of the better grades of braided silk are suitable for the bait-casting line. The average price for a dependable line is about $1 for 50 yd. A small-size line is best, and sizes G and E are preferred. A brown and green, or other dark-colored, line is preferable for fishing. The black and white, all white, and other light-colored, lines are satisfactory for tournament use. After a day's fishing the line should be unreeled and looped around the back of a chair in loose coils to dry, or loosely wound upon a drying reel.

For practice and tournament casting, one of the standard ¼ and ½-oz. loaded

wooden or metal plugs may be used. The popularity of bait casting from the reel has brought forth a large variety of artificial baits. These wooden and enameled lures are used by anglers because they bring the catches.

The wooden minnows, and other forms of artificial bait, may be roughly classed in three divisions: the surface lures for use on top of the water; the diving and under-water baits; and the weedless varieties, which are usually of the surface type. No bait caster's outfit is complete unless it includes one bait of each class, and to meet fully the different and varying conditions of weather, season, and water, it is a good plan to select one of each type in light and medium-dark colors. A variety of typical baits are shown in the page plate at A, B, C, etc. Many of the baits are provided with one or more eyes for attaching the line, thus enabling the caster to spin his bait at different depths. All of the wooden-body baits will float, and only dive under the surface when reeled in; the quicker they are retrieved the deeper they spin. While many of these baits have been designed especially to entice the black bass, practically all of them are good for pickerel and general fresh-water casting, particularly the minnow baits.

The other items which complete the bait caster's outfit are the landing net and tackle box. The net should be well made, with a steel hoop 13 in. or larger in diameter, and should have a handle about 3 ft. long. The folding type of net is the most convenient, and is provided with a separate handle. The tackle box may be of sheet metal or leather, with partitions for holding reels, baits, and the angling "what not." A convenient and serviceable landing net costs $1 or more, and a tackle box will cost about as much.

Suggestions on Making the Cast

Although much practice is required before the caster can take his place in a tournament, "getting the hang" of handling the short rod and free-running reel comes quickly. As soon as the simple principles are understood, length and accuracy will come only through practice. Bait casting is easier than fly casting and the angler need concern himself only with the length and accuracy of his cast, since delicacy does not enter into this phase of fishing. The coarser sweet-water fish, like black bass and pickerel, are not frightened when the bait hits the water with a splash—indeed, the splash of the bait attracts them.

Two methods of casts are used by bait casters, the overhead and the underhand or side cast. The overhead cast is used largely by the practical angler, as well as by those who take part in tournament contests, because the bait is projected a longer distance and may be more accurately placed. If the novice will thumb the line, as shown in Fig. 1, with thumb bearing directly on the cross rod of the reel with the ball of the thumb resting lightly on the line, one or two trials will show the correct manner of spooling. The line is retrieved as shown in Fig. 2, care being taken to form correct habits from the start. To make the cast, reel in the bait until it is some 6 in. from the tip, release the click or drag, and press the ball of the thumb firmly upon the spooled line. Carry the rod over the shoulder until it is horizontal or nearly so, as in Fig. 3, and then bring it smartly forward, checking it quickly when it reaches an angle of some 45°, as shown in Fig. 4. This projects the bait forward in a straight line. When the rod is brought forward the tension of the thumb on the spool is released so that the spool will revolve freely, but enough pressure must be communicated by the thumb to prevent the reel from spinning faster than the line is unreeled from the spool, otherwise backlash will occur. The use of the whole arm and the weight of the body, combined with the elasticity of the pliant rod, enables the caster to cover a surprisingly long distance after a little practice. A distance of 150 ft. is not difficult to attain, but for fishing, a well-placed cast of 60 or 75 ft. is long enough to reach promising stretches of water.

The Method of Thumbing the Line is Shown in Figure 1, and the Correct Form in Retrieving the Line, in Figure 2. The Overhead Cast is Illustrated in Figures 3 and 4, and the Underhand or Side Cast in Figures 5 and 6

FIG. 3

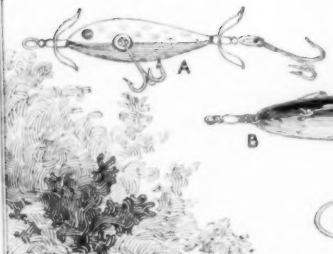


FIG. 1

FIG. 4

FIG. 2

FIG. 5

Typical Baits:
A, Under-Water Minnow;
B, Wabbler Spoon;
C, Bass;
D, Fluted Wabbler;
E, Weedless;
F, Diving; G, Combination Color, Taste, and Smell;
H, Spoon and Minnow Bass; I, Surface

FIG. 6

The underhand or side cast is somewhat easier to master, and is made much in the same way as the overhead cast, only the rod is swung horizontally to the rear, the tip on a level with the angler's chest, as shown in Fig. 5. Bring the rod forward smartly in the direction it is desired to shoot the bait, check the rod when about horizontal, partly releasing the pressure of the thumb, just enough to allow the spool to revolve freely, and check the line as the bait hits the water. Figure 5 shows the beginning of the side cast and Fig. 6 the cast completed. This cast is useful when fishing from a shore overhung with trees, and with practice the bait may be projected a long distance.

The chief factor of skill in bait casting from the reel lies in controlling the line, and the thumb must be trained to do this through practice. Some casters turn the reel sideways with the handle downward while making the cast, but the majority keep the reel level and cast with it in the same position as when reeling in. Thumbing the line is easiest done when the spool is well filled, and if the casting line is not long enough to do this, sufficient common line should be first wound on to fill it.

The successful bait caster is one who possesses an intimate knowledge of the fish he casts for, and while a lengthy exposition is not to form a part of this article, reference to the fish commonly sought by the caster will not be amiss. The fish generally of interest to the bait caster are small and large-mouth black bass, pike, muskellunge, and pickerel. The small-mouth black bass is classed as the finest game fish, ounce for ounce, by many casters. The muskellunge, often confused with the Great Lakes or English pike, is more limited in range than the pike, being found in the Great Lakes region and the waters of the St. Lawrence River.

Since the habits and general characteristics of the large-mouth bass are much the same as its near relative, the small-mouth, the following hints apply to both. When wading, it is well to cast downstream. Cast in the shallows, near the weeds and snags, and close to stumps. As little noise should be made as possible.

For early-spring casting, bass are likely to be found in the shallows and sheltered places during the day, because the water is cool at this season. The pickerel will also be found in the warmer and shallower waters. The most successful baits at this time are the diving minnows, and other under-water lures. As the warmer days of late spring and early summer appear, the bass swim out into deeper and cooler water, while the pickerel remain close to the lily pads. The wooden minnows are excellent baits to use at this season. When the weeds are very thick, one of the several kinds of weedless baits may be used.

The early-morning and late-afternoon hours are the best for midsummer casting, and the shallow places are the good spots to work over. If there are any brooks or streams emptying into the lake or pond, do not neglect to work this stretch well at the mouth. When the sun is low, the white or light-colored surface baits may be substituted for the medium-dark colored diving varieties, and for casting after dark, a luminous or moonlight bait will often give good results. During the fall months fishing conditions are similar to casting in the spring, but the deep water is then the warmest, and the under-water or diving baits are usually the best.

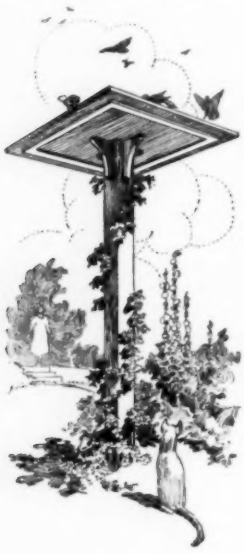
To catch bass, the angler must cast his bait where the fish are feeding, and he will find it an advantage to match natural conditions, so far as possible, in selecting his baits. For casting on bright days in clear waters, the red, white and red, white, or green minnows are good lures, as are also the silverplated spoon baits. Cast well ahead of the boat, and reel in very slowly to keep the plug spinning well below the surface. On cloudy days and in muddy waters, after a heavy rain, for example, use red and yellow baits and goldplated or burnished-copper spoons. The best all-around bait —equally good for bass and pickerel— is one of the green-backed minnows,

but no one bait can be expected to meet all conditions, hence the caster should have a fair assortment of baits.

A stiff casting rod with plenty of backbone is essential for muskellunge. The angler is out after big game and must be prepared for the sport. A hard, braided silk line, size E, and 3-0 or 4-0 hooks, snelled and swiveled, are the best. Any of the wooden baits suitable for pickerel—the minnows especially—are good for muskellunge. A man to handle the oars is a handy companion, and after casting the bait just outside the weed bed, make for deep water as soon as a fish is hooked. The fish will be seen and felt quickly enough, and when it breaks water and leaps in the air, give it a little slack line quickly, otherwise the strain will snap the leader. A twisted, bronzed trace is the best to use between line and bait, and this need not be longer than a foot—6 in. is enough. When the fish is brought alongside, shoot him through the head with a revolver, which is probably the most satisfactory manner of making an easy landing.

A Cat-Proof Bird Table

Our bird table is a source of great enjoyment, particularly since the birds feel secure from cats or other enemies because of the construction of this ornament in our garden. The sketch shows the arrangement of the table braced at the top of a 6-ft. post. Shrubbery surrounds the table and a light evergreen climber clings to the post, yet does not give the cats a good foothold.



Experience has taught us that birds in general prefer bread crumbs to other varieties of food, and they are also fond of cracked wheat. The linnets like oranges particularly. We cut an orange in two and place the halves on the table. It is amusing to see the birds balance on one side of the orange while they peck at the fruit. Soon the orange peel is almost entirely emptied. We provide a small basin of fresh water on the table, and the birds use it as a drinking cup as well as a bathtub.—F. H. Sweet, Waynesboro, Va.

Making Photographic Prints Glossy

Pictures printed on glossy, semiglossy, or semimat paper may be given a high gloss by the following method: Obtain a sheet of clean glass, without scratches, and apply a solution of a piece of paraffin, the size of a walnut, in one pint of gasoline. Use a soft cloth, and when the glass is dry, rub until all traces are removed. Soak the prints in water for 10 minutes and place them on the glass, face down. Place a clean blotter over them and roll on it with a print roller, to remove excess water and to give them a good contact with the glass. Dry the prints in a warm place, preferably where there is a draft.—M. E. Fuller, Detroit, Michigan.

Shaving-Brush Holder

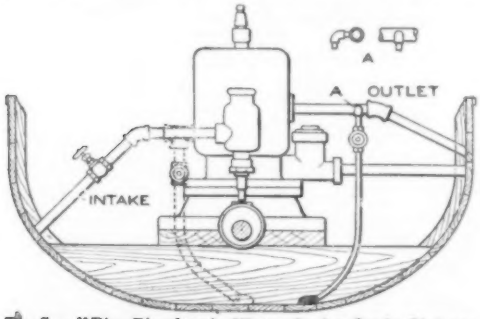
A shaving brush is injured by permitting it to remain in the mug to dry. It should be suspended with the hair down so that it may dry thoroughly and quickly. A hook made from a piece of wire bent to form a loop, with a pointed section at each side of it, may be made easily. The loop should be of a size to fit the thin portion of the handle, and the pointed ends of the wire are driven into the wall or other support. A loop may be made at each end instead of pointing the wire and the device fixed to the wall with two small screws placed through the end loops.

Guard Saves Wear on Vest

Bookkeepers and others who work close to a desk nearly all day find that unusual wear results on the front of the vest, forcing them to discard their suits sooner than would otherwise be necessary. By providing a strip of cloth of a color to match the goods of which the suit is made and buttoning it across the front of the vest from the lower to the upper button this wear is prevented.—J. A. McGrath, Hancock, Michigan.

Bilge Water Siphoned Through Water-Jacket Outlet

The sketch shows a simple method of removing the bilge water from a motorboat automatically while the engine is in operation. A small pipe is fitted into the outlet from the water jacket, as shown at A, and extended to the bottom of the boat where the bilge water accumulates. A sack is fixed over the end of the pipe to prevent particles of dirt from entering the pipe. The water passing out of the water-jacket outlet causes a siphoning action in the small pipe, and the bilge water is drawn up and passes out of the larger outlet. At the left, in dotted outline, is shown a method of removing the bilge water by permitting it to be drawn up into the pump which supplies the water to the water jacket.

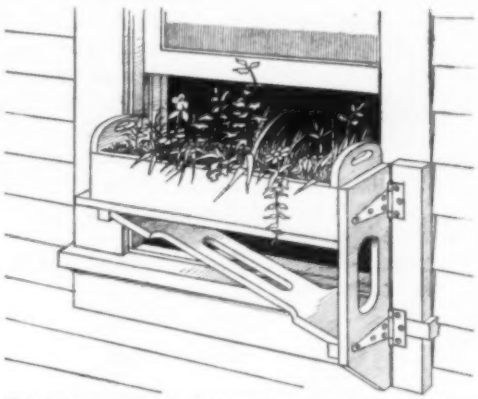


The Small Pipe Fixed to the Water-Jacket Outlet Siphons the Bilge Water from the Bottom of the Motorboat

This method is sometimes used, but is satisfactory only when the bilge water can be kept clean, which is difficult. —Francis B. Dashiell, Baltimore, Md.

A Hinged Window Box

A window box arranged to rest in a hinged bracket on the outside of a window, as shown in the sketch, has advantages over the usual method of fixing the box permanently. The box is separate from the supporting frame and may be removed from it. The frame is attached to the window casing by means of T-hinges and is strongly supported by a bracket. When it is desired to clean the window, the device may be swung around and out of the way. This feature is also desirable when it is raining, for the flowers in the box may be watered conveniently in this way.—L. J. Hough, Toledo, Ohio.



The Flower Box is Arranged to Swing Away from the Window so That It will Not Be in the Way

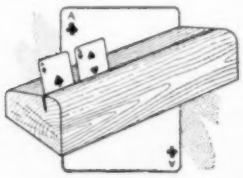
Denatured Alcohol to Start Gasoline Stove

Considerable smoke and dirt is caused by the burning of gasoline used to generate gas in starting a gasoline stove. This may be eliminated by keeping an oilcan filled with denatured alcohol convenient to the stove, and filling the starting pan with alcohol instead of gasoline. The spout of the oilcan is also convenient in pouring only a small quantity into the pan.—Spencer A. Pease, Chicago, Ill.

¶A strip of adhesive tape, fixed to the lower side of a straightedge used for cutting glass, will prevent it slipping.

Playing-Card Holder

While disabled with a broken arm and being anxious to play cards for diversion, I was at a loss to hold my "hand." I soon devised the card holder shown in the sketch, and found no difficulty keeping in the game. It is made of a strip of wood provided with a groove near the front edge, into which the cards are inserted.—W. E. Thomae, Milwaukee, Wisconsin.

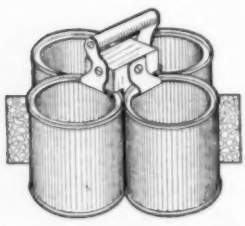


Cocoanut-Shell Trays

Trays for holding matches, or other articles, may be made of cocoanut shells by cutting them to appropriate sizes and smoothing the surface to a polish. The tray shown in the sketch was made in this manner, as were a number of match trays which were fitted with small sheet-metal dishes. The outside of the shell is first scraped as smooth as possible, sandpapered, and then oil-polished, producing a beautiful finish.—John F. Long, Springfield, Mo.

Nail Carrier Made of Cans

Four ordinary tin cans, fastened to a wooden block as shown in the illustration, make a serviceable and practical carrier for nails, staples, or similar materials, used in making repairs on the farm or in the shop. The tops of the cans are cut out carefully and the edges smoothed off so as not to injure the hand in removing nails from them. The tops are cut to the shape shown, as attached to the block, and provided with a handle, making it convenient to carry the contrivance. If cans are used having covers which may be pried off, the central block should be extended and the handle nailed directly to it.—Dale R. Van Horn, North Loup, Neb.

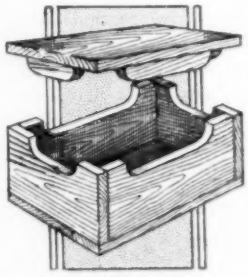


Stopping Rattle in Motorcycle Stand

Annoyance while traveling over rough roads by the rattling of the rear stand on a motorcycle may be overcome by taping the part of the brace which hooks into a catch at the end of the rear mud guard. The sketch shows a view of the lower portion of the rear wheel with the stand raised and in place in the catch.

Novel Covered Box for Index Trays

The box shown in the sketch is novel in that it provides a nonsliding cover with a minimum of wood for the construction and the use of no extra space for the lid. Where index, or other, boxes must be provided in considerable numbers, or stored in a limited space, the saving will be worth while. Index cards, or other material, may fill the box to its upper level without hindering the availability of the cover. The small portions attached to the cover are cut from the side and end pieces.—DeWitt C. Ramsay, Bridgeport, Conn.



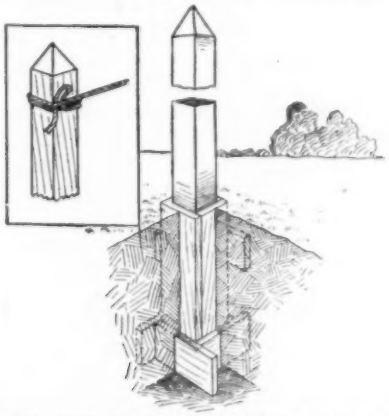
¶Small parts may be soldered conveniently by holding them with a clip made of a piece of clock spring.

A Simple Barometer

A barometer that will indicate weather changes with reasonable accuracy may be made of two bottles. A milk bottle nearly filled with water is used as the container and a smaller bottle fitting snugly into the top is inverted in the mouth of the milk bottle. The mouth of the inverted bottle should extend about an inch below the surface of the water. Weather changes will cause the water to rise and fall in the neck of the inverted bottle.

Removable Posts for Tennis Court

It is sometimes desirable to have tennis-court posts arranged to be easily removed from the lawn or the court when the grass is being mowed, or during the winter. The method of fixing the posts in the ground, as shown in the sketch, makes it convenient to remove the posts and still gives the necessary stability. A square wooden box, tarred to resist the moisture, is placed in the ground, and the post is fitted into it. The upper end of the box is level with the surface, and when the post is removed a wooden block is fitted into the opening. Removal of

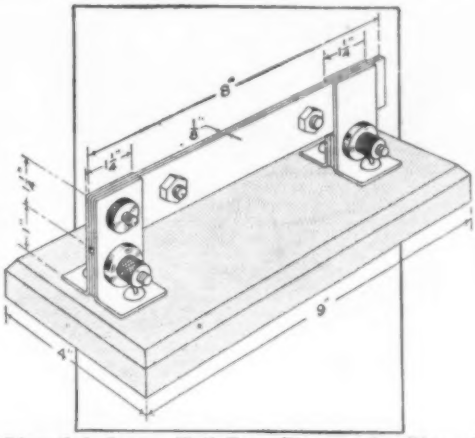


The Post may be Removed for Mowing the Court or When Not in Use

the posts permits the mowing of the grass close to them and leaves the place free from obstructions when the court is not in use.—Edward R. Smith, Walla Walla, Wash.

Lightning Switch for Wireless Aerials

Amateur wireless operators often cannot afford to buy a lightning switch such as is required to ground the aerial



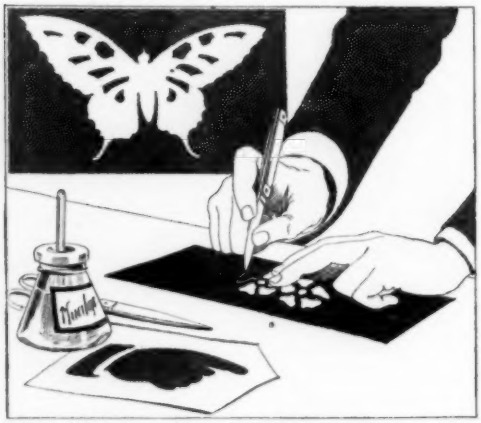
Discarded Copper Half-Tone Plates and a Piece of Marble were Used in Making This Lightning Switch for Wireless Aerials

when not in use. The sketch shows such a device, which was made of a marble slab fitted with copper strips cut from discarded half-tone plates. The base was smoothed and polished to the size indicated, 4 in. wide and 9 in. long. The upper edges were beveled off, and holes were drilled near the ends through which bolts were passed to fasten the small brackets supporting the crossbar.

The copper pieces were made as follows: The plates of $\frac{1}{16}$-in. copper were cut into strips, $1\frac{1}{4}$ in. wide. Two were made 8 in. long; four, 3 in. long, and four, $\frac{7}{8}$ in. long. The 8-in. strips were fastened together with small bolts and a hole was drilled through one end of the joined pieces to fit the bolt which forms the pivot for the switch. The 3-in. strips were bent to form a $\frac{3}{4}$-in. angle, through which holes were bored for fastening to the base. The $\frac{7}{8}$-in. strips were clamped between the brackets at their lower ends to provide a slot for the crossbar. The bolts, by which the brackets were clamped together, were provided with binding nuts to which the wires were connected. A handle might be fixed to the crossbar, but this is not essential.

Stenciling with Photographic Films

Photographic films make excellent material from which to cut stencils for use in marking show cards, placards,



Serviceable Stencils may be Cut from Photographic Films, and Afford a Practical Means of Making Signs and Other Forms

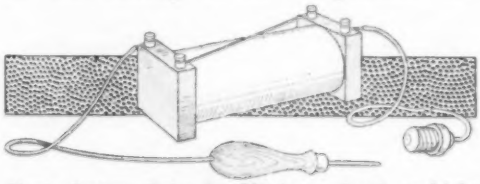
etc., as well as for other uses to which stencils are put. Pictures, or other designs to be stenciled, may be pasted to the film and the outline cut, care being taken that the design is adapted for stenciling. This is important, since frequently binding strips must be left in the design in order to make it possible to cut a satisfactory stencil from it. The films are used with the rough side down, to prevent them from slipping. A variety of subjects for stencil design may be adapted from pictures clipped from publications or other sources.—Robert Smith, New Westminster, B. C., Canada.

A Gas-Stove Lighter

For lighting the gas stove, matches are not only untidy but inconvenient. In lieu thereof I use a simple affair consisting of a wood handle with a large nail set in the end, with which it is only necessary to touch the burner in order to start a flame. There is nothing to wear out and no parts to renew. Furthermore this gas lighter uses only one wire—a fact that is apt to strike a person as being rather unusual on first thought. However, if the reader will connect one terminal of a 60-watt lamp with the gas main or to the gas stove and then touch the other terminal successively with each of the two ends of the live wires it will be found that the lamp will light up with one terminal but not with the other, for the reason that one side of the circuit is usually grounded at most electric-light plants as a precaution against lightning.

All that is necessary to get a spark is to provide a suitable resistance coil with an iron core, so that the fuse will not be blown and to secure sufficient inductance to get a hot spark. The writer uses an ordinary 50-ohm telephone induction coil, in which the primary and secondary are placed in series by the diagonal connection indicated in the sketch. Almost any coil or electromagnet of 25-ohm resistance, or more, connected in a circuit will prove safe and give a hot spark. Place the coil in some out-of-the-way corner, and run one strand of the usual flexible cord to the handle, which should be hung at some convenient point at the right-hand side of the stove. Let the handle itself be long enough so that there will be no tendency to catch hold of the metal point. Run the flexible cord through the center and out at the lower end, into which a wire nail with the head removed is driven. Solder the wire to the nail, and the lighter is ready.

For lighting Bunsen burners, and other fixtures using rubber tubing, a small wire may be run down the center of the tubing so as to ground the



Single Contact Point for Making a Spark to Light a Gas-Stove Burner or Tip

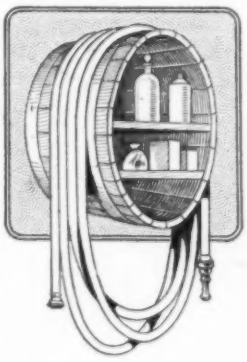
burner, or else a small surface on the workbench may be covered with tin and this grounded, so that it is only necessary to set the burner thereon to get a light.—John D. Adams, Phoenix, Arizona.

To Stop Rattling of Windows

Annoyance from the rattling of windows may be overcome by attaching a small block to the side of the window casing so that it will engage the sash and hold it firmly. The block should be of ½-in. wood, about 3 in. long, 1 in. wide, and have one end rounded off. A screw is fixed through the block near the rounded end and driven into the window casing at such a point that when the block is turned upward on its pivot the rounded end will act like a cam and force the sash firmly against its grooves.

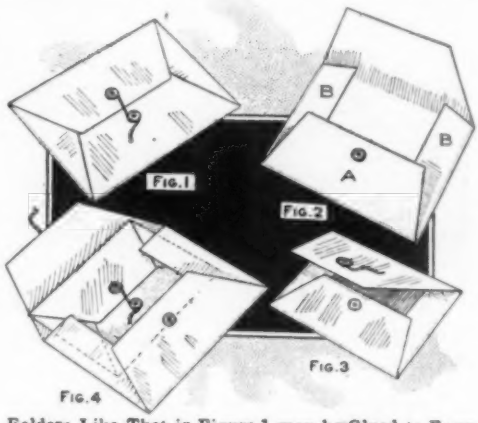
Practical Bracket for Garden Hose

Care in the storage of a garden hose will pay the owner in the longer life of it, and the homemade bracket shown in the sketch suggests a convenient method of caring for the hose. A portion of a barrel was sawed off at one of the hoops, and after reinforcing it by nailing the hoops and inserting shelves, it was nailed to the wall. The hose may be coiled over it in shape to be easily carried to the lawn or garden, for use. The shelves provide space for an oilcan for the lawn mower, and other accessories.



Making Filing Envelopes Quickly

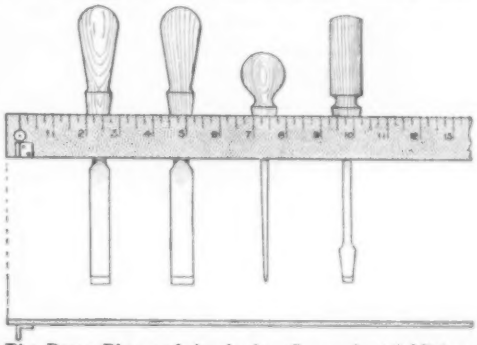
Folders in which large cards, calendars, posters, etc., are commonly mailed may be utilized to make convenient filing cases. Envelopes of the type shown in the sketch, with leatherboard and cord fasteners for holding the flaps together, may be cut to a uniform size or used in any smaller size desired, and, by gluing the flaps A and B, will provide serviceable containers. Small tools or other objects likely to injure a single-thickness folder, or drop out of it, may be stored in double envelopes made in this way.



Folders Like That in Figure 1 may be Glued to Form Envelopes, Figure 2, or Cut Down to the Size Shown in Figure 3, for Use in Combination, Figure 4

Yardstick on Tool Rack

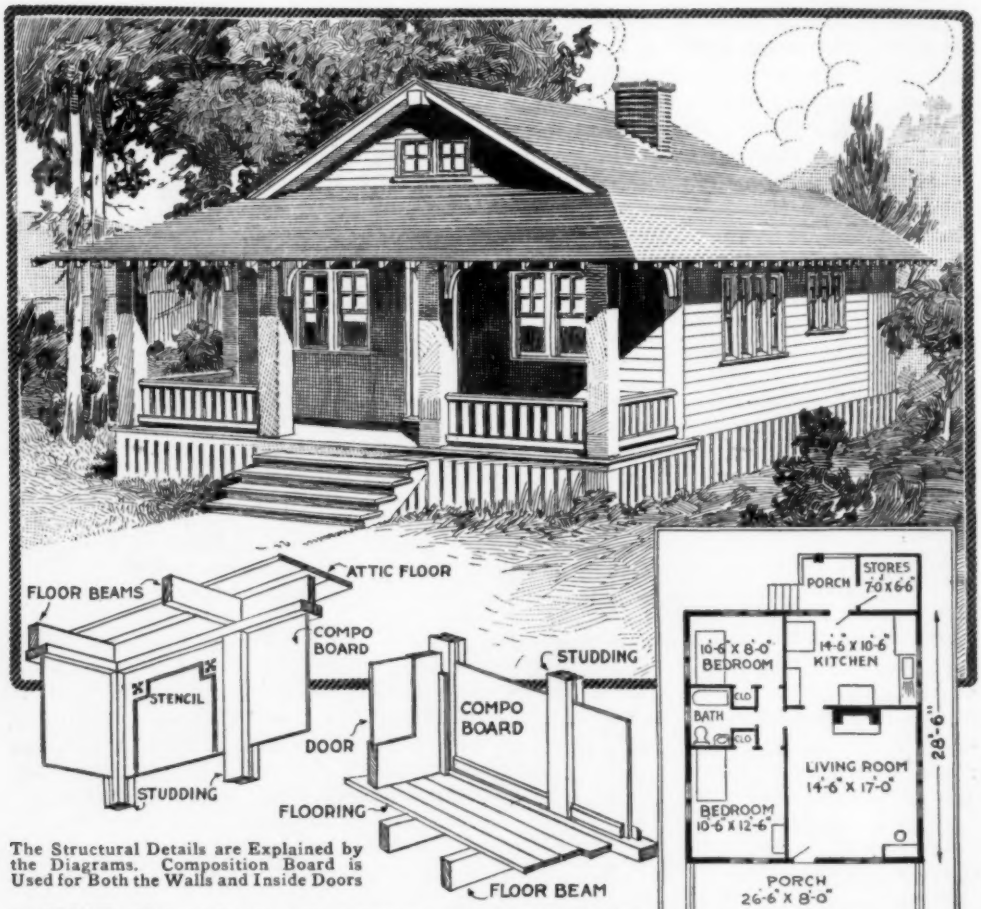
I have derived considerable satisfaction from the use of a yardstick fitted above my workbench. A plug of brass, having a center-punch mark, was inserted at the zero point on the yardstick. This is convenient in setting dividers and other instruments. Below the plug was fixed a small brass angle, set so that its inner face was at the zero point. This is useful in measuring pieces from a finished end. If the end of the yardstick is at the zero point it is necessary to attach a small extension to take the brass plug.—V. A. Rettich, Hollis, N. Y.



The Brass Plug and Angle Are Convenient Additions to the Yardstick, Which Forms the Front of the Tool Rack

September P.M. 650 .15 Cent

FOUR-ROOM SUMMER BUNGALOW OF LOW COST



The Structural Details are Explained by the Diagrams. Composition Board is Used for Both the Walls and Inside Doors

THOSE who wish to own summer cottages in remote localities, where skilled labor is unavailable and hauls are long, frequently find the building problem a difficult one. Illustrated herewith is a plain, simple bungalow of low cost which is designed to meet such conditions. For a small family in moderate circumstances it offers a sightly, serviceable mountain or lake residence for the warm months in the North, or the winter season in the South. It is of a type that can be erected quickly by ordinary workmen. It has been built for $1,200—a sum that ought to be sufficient to construct it in almost any locality reasonably near a railroad or small town. The bungalow is 26½ by 28½ ft. in its ground dimensions, has four rooms, a front porch, and plenty of windows. The kitchen is designed to serve also as a dining room, in order to provide two bedchambers. If less sleeping room would be adequate for one's needs, a slight alteration in the floor plan would furnish a dining room. There are two closets and a toilet room, while a small storage compartment is accessible from the rear porch. The walls are of composition board and paneled, as are the ceilings. The rooms are finished in calcimine and the panels outlined with stenciling. An open fireplace heats the living room and is so situated that its chimney carries a flue for the kitchen range.

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